A Database Publication

THE MICRO USER

Volume 9 Number 3 May1991 £1.50

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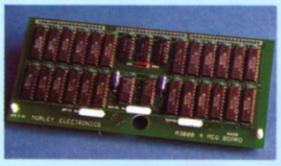

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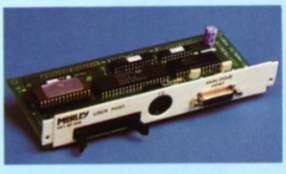

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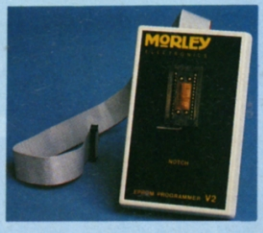

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COVER STORY

THE Acorn range of micros is ideal for tinkering, and in this issue there's a whole selection of interesting utilities and aids to programming for you to use. Look for the toolkit logo.

37 **Game Diary**
The continuing saga of how a commercial game was brought to your screen.

44 **Gambling**
We can't tell you how to beat the bookie, but we can show which way to follow.

55 **Show Registers**
Debugging ARM code can be a nightmare – so sleep easier with this handy little utility. *

63 **Sort Evaluator**
Deciding which routine is best for sorting can be tricky, but this program will sort them out. *

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro. *

Get it right ✓

All the major listings in this magazine are accompanied by checksums to help you key them in correctly. For full details of how to use them see the article on page 56 of the February 1991 issue.

MICRO USER CLASSIFIEDS

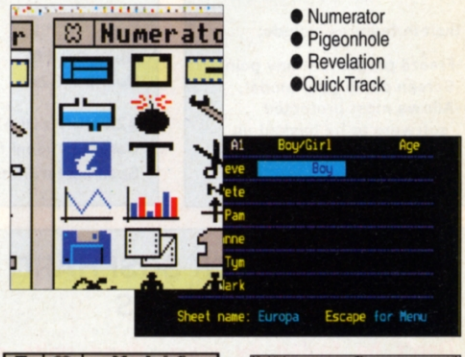
The best bargains in the world of all Acorn micros come from fellow readers of The Micro User. Turn to Page 46 to find just what you're looking for – from cheap modems to complete computer systems.

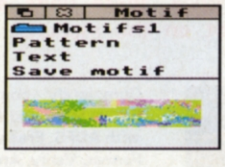
Education

23 **Update**
Up-to-the-minute news of the Acorn range of micros in use in the world of education

27 **Reviews**
Catch up on the latest software for the BBC Micro series in schools, including:

- Numerator
- Pigeonhole
- Revelation
- QuickTrack





REGULARS: News 9 ● Hac Man 14 ● PD 20

SPECIALS

67 **Font styler**
Print out samples of your FontStyle quickly and automatically.

PROCs and FNs **85**
Find the procedures or functions you want without re-loading previous programs.

91 **App to Mod**
Now your important utilities can be available at the touch of a button.

Module Header **93**
Creating header code for Archimedes and A3000 modules is repetitive. Not any more!

101 **Interface**
A new series that shows how writing software is more than just programming.

The Micro User is 100 next month! And to celebrate our century the magazine is E X P A N D I N G!

It'll be BIGGER and BRIGHTER and more COLOURFUL

There'll be wider pages and even more extensive coverage of the whole range of Acorn computers. We're starting our new century as we mean to continue!

Newcomers

33 **Tracer**
Turning sprites into line drawings can be easy using this amazing drawing package.

35 **Archway**
Discover a way to write your own multi-tasking applications without wrestling the wimp.

41 **The Missing Link**
We check out this high speed multi-tasking program that links together two Archimedes.

57 **Equasor**
Typesetting mathematics isn't easy – unless you have this unique package.

81 **ShowPage**
A progamming language? Or just the cheapest PostScript printer in the world?

48 **Our experts delve into what's new among the latest games releases.**

SOFTWARE SCENE

FREE Software

Subscribers to *The Micro User* will receive the following software on disc or tape wth this month's magazine:

- All the type-in listings
- Danger Dog (Master version)

In addition, those readers with a BBC A3000 or Archimedes series machine will also get:

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Break 147 & Superpool — **June '91**
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CHOCKS AWAY EXTRA MISSIONS

BOOGIE BUGGY

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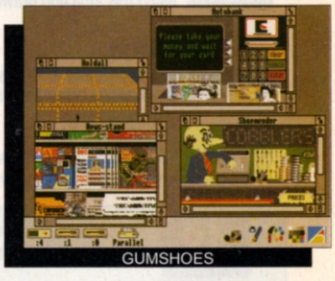
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Chocks Away Extra Missions

CHOCKS AWAY

This new updated Mark II Chocks Away with supersmooth animation really is flight simulation the way you've always wanted it. It has everything for the beginner and the expert:

- Beautiful 256 colour graphics and 'nerve shattering' digitised sound effects
- Easy to fly, yet highly manoeuvrable bi-plane - ideal for all ages/skill levels
- **Revolutionary 2 Player Option** using split screen display. This allows 2 players to each fly their own planes simultaneously in practice, dogfights, or missions
- Full joystick, dual joysticks, mouse and keyboard control options
- **Amazing "Black Box Flight Recorder"** included so that you can record your own flights and then save & replay them. 90 minutes of totally absorbing pre-recorded training flights are included with the game
- Internal/External views of your plane can be selected from front/rear/left/right
- Powerful 30mm canon capable of very rapid fire and long range destruction
- Easy to read instrument panel and simple controls
- 3 very varied immense maps to explore - approximately 18000km^2 in total
- 20 fascinating and varied missions of increasing complexity are included with a promotion system from Cadet right through to Marshal of the RAF
- Superb range of targets/enemies including bombers, triplanes, fighters, tanks, control towers, anti-aircraft guns, head quarters and patrol boats

Chocks Away Mark I Version was awarded **GAME OF THE YEAR 1990** by **Acorn User, A&B Computing (now Archimedes World), RISC User & Micronet**

"Graphics in the game are superb, smooth and with plenty of ground detail... this is a really enthralling flight simulator with plenty of variation and features to ensure longevity." **RISC User, Dec '90**

"Chocks Away is a delightful game." **Archive, Jan '91**

"Chocks Away is a brilliant game." **BBC Acorn User Dec '90**

"... It's a really great game, Playability 10. Value 10." **The Micro User, Jan '91**

"**(Chocks Away Mark II Version)**... The increased speed obviously makes the game more responsive and fun to play, well and truly overtaking Interdicter II as the best Archimedes plane game." **New Computer Express, Feb '91**

CHOCKS AWAY EXTRA MISSIONS

This consists of a new manual and a disc containing an additional 26 missions (6 of which are reconnaissance missions). It is loosely based on the original Chocks Away and features an extensive range of extra features and improvements. To run it, you will require the MkII version of the original Chocks Away. Extra features include:

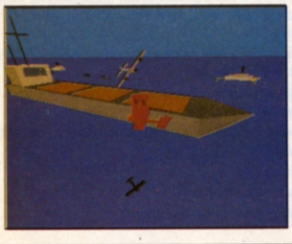
- 16 new & detailed maps based over land and sea.
- 20 enemy planes and 20 enemy targets are included in each mission. Over 1000 extra targets and planes have been carefully defined.
- Considerably improved action on all missions with plenty of targets to shoot at and plenty shooting at you.
- You can view the action from any of the enemy planes or targets and your own control tower at any time even while still controlling your own plane or watching a saved flight. There is a selection of tracking cameras (with adjustable zoom lenses!) around the playing arena. In addition a phantom plane can also be selected to follow the action on any or your black box flight recordings.
- Improved enemy pilots capable of performing loops, rolls, stall turns etc. All enemy planes are carefully modelled using the same equations controlling your own plane. This ensures both an accurate and fair simulation.
- More enemy planes and targets to shoot including: Three Engine Fighters, Enormous Cargo Planes, Airships, Barrage Balloons, Gun Boats, Oil Tankers, Trains etc.
- Six reconnaissance missions where you are required to take photos of various installations with your new on board camera.
- Improved graphics over the 16 maps including Complex Cities, Houses, Railways, Roads, Rivers, Bridges, Lampposts, Railway Stations, Oil rigs, Piers, Beaches, etc. to mention but a few. In total over 100 different graphics have been defined.
- Serial Port Link Up option so that you can link up 2 BBC A3000 or Archimedes computers and 2 pilots can fly simultaneously in full screen mode.
- Extensive enemy flak guns and improved enemy plane guns help make the new missions both more interesting and challenging to say the least!
- Improved digitised sound effects plus, of course, all the extensive options which are available with the original Chocks Away.

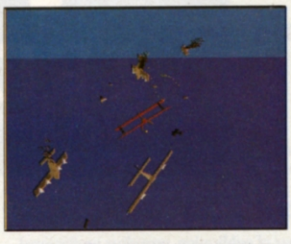
WIN a superb.....

"Radio-Controlled Biplane"

Successful completion of all 6 Reconnaissance missions will allow you to enter this competition

TALLY HO GINGER!





ARCHIMEDES & BBC A3000

All versions are compatible with the BBC A3000 and 310 & 400 Series

CHOCKS AWAY	(Mark II Version with 1 or {split screen} 2 player options)	£24.95
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News BEAT

BBC Micro bridges training gap

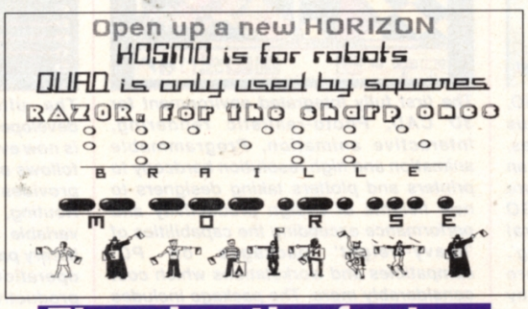
WHEN the man from Granada comes to repair your television, he may well have received some of his training on a BBC Micro, courtesy of *The Micro User*.

The rental company's technical training manager Grahame Sanders plans to use the waveform program featured in December's *Micro User* to instruct engineers at Granada's training schools and service centres.

"We currently use a number of BBC Micro programs in our Technical Improver Programme", said Grahame. "They were written by myself as an experiment in computer training and have proved to be popular.

"I have for some time been on the lookout for new programs which might be suitable and waveform package featured in *The Micro User* fits the bill".

Written by Paul Houghton, the program allows users to build up waveforms on their BBC Micro using a basic wave shape. It is designed to give better understanding of electronic signals.



Flagging the facts

WAVING the flag for Archimedes users who like unusual fonts, Longman Logotron (0223 323656) have included a Semaphore option in their new PenDown Outline Font disc.

It allows text to be typed in a standard font then easily translated into semaphore with a range of amusing characters wearing the appropriate letter and making the corresponding flag signal.

Also included on the 12 font disc are similar options for transferring text into both Morse and level one Braille.

The fonts are suitable for use with PenDown, Magpie or any Risc OS application which exploits the Outline Font Manager and can also be used with the company's banner-making facility for PenDown. Price, 18 plus VAT, postage and packing.

Borrow from a Macintosh

DESIGNERS and artists using BBC Micros and Archimedes machines can now benefit from the many paint packages, clip art libraries and scanned images designed for the Macintosh.

Colour Screen>Mac from Human-Computer Interface (0223 314934) will transfer colour or mono images between the Mac and the Acorn computers.

Seen as a useful tool for publishers and technical writers, Colour Screen>Mac includes built-in software to transfer files between machines via a serial cable.

For the Archimedes, there is also an option to exchange files via a 3.5in Dos format disc using Apple File Exchange.

It converts to or from a BBC screen dump in any appropriate graphics mode, including teletext.

Colours assigned to each logical colour in the original dump can be adjusted to take account of different palette settings.

Colour Screen>Mac is a follow-up to HCI's View>Mac which transfers and converts text documents and BBC>Mac the file transfer link between a Mac and BBC Micros on an Econet network. Price, £95 plus VAT.

Taking the bite out of crunching

ARCHIMEDES users who need to crunch numbers in a big way will welcome a major new upgrade shortly to become available for FIRST –the powerful statistical package from Serious Statistical Software (051- 327 4268).

It's a context sensitive online Help system which will be particularly useful to the education sector and for new or occasional users, cutting down the number of times they refer to the manual.

FIRST is widely used in the physical and life sciences, medicine and psychology. The upgrade will be released in May and existing users will be able to upgrade for £25. FIRST costs £150 for a single user licence.

On track for an accolade

ACORN's A3000 has been nominated as one of the finalists in line for title European Home Computer of the Year – the premier accolade in the technical excellence section of this year's European Computer Leisure Awards for which *The Micro User* is a sponsoring magazine.

The awards are run in conjunction with The European Computer Trade Show and finalists have been nominated by journalists from 31 computer magazines drawn from 12 countries and with a total readership of more than eight million.

Winners will be judged on the first day of the show by a panel of top international journalists, including a senior member of *The Micro User*'s editorial team. The awards will presented at a ceremony at London's Hippodrome nightclub that evening, Sunday, April 14.

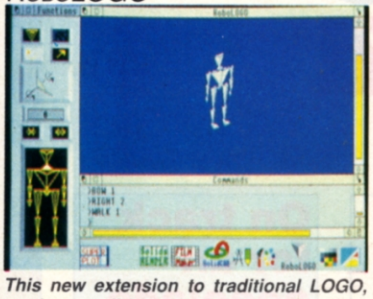
Check prices

THIS issue of *The Micro User* was at an advanced stage of production when the Chancellor announced VAT changes in his latest budget. Many of the prices printed are pre-budget and readers are advised to check new prices with the appropriate suppliers.

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

RoboLOGO



This new extension to traditional LOGO, made possible only by the enormous computational power of the Archimedes, provides three dimensional control of an articulated humanoid or animal figure through the use of a standard LOGO language. Sophisticated natural commands such as 'Walking', 'Turning', 'Bowing', and 'Picking', etc are automatically represented graphically by natural movements of the 3D figure. This natural form of graphical response is readily understood by students using LOGO to learn the concepts of logic & reasoning. The traditional Turtlegraphics & 3D Glider features are also supported for easy transition to this innovative concept in natural response LOGO.

(RISC OS) New

Realtime Solids Modeller

The package includes both the sophisticated design environment of SolidCAD and the high speed capability of a Realtime Graphics Language module to provide the fastest programmable animation facilities bringing any design to life from within your own programs. Facilities include 3D Rotate, Scale, Orbit, Perspective, Position & extensive display styles for wireframes, hidden-surface removal, smooth shading and multiple light sources with individual intensities.

(RISC OS) New

Gate Array Design System

An introductory course for teaching Silicon Chip Design with facilities for Array design, Cell design, On-line Help and a tutorial on integrated circuit design. Ideal as a low cost teaching tool for engineers & students where expensive silicon fabrication facilities are not required.

(RISC OS) New

SolidTOOLS

The first fully integrated environment for 3D CAD, Photo-realistic rendering, Interactive animation, Programmable animation and high resolution hardcopy to printers and plotters taking designers to new heights of design productivity and performance exceeding the capabilities of 'heavy-weight' packages on PC-compatibles and workstations which cost considerably more. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your design and presentation requirements.

(RISC OS) New

SolidCAD

The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity.

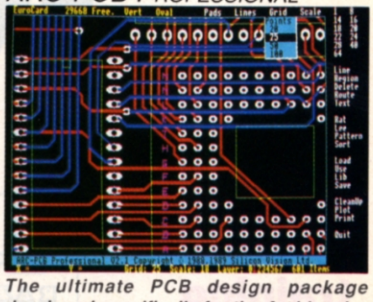
(RISC OS) New

FILM-Maker

The package provides an interactive environment to create animated sequences of 3D scenes with dynamic camera motion for 'walk-throughs' and 'flight-paths' for objects within the scene. Fully compatible with SolidCAD for designs and SolidsRENDER for ray tracing, animation Oscars are now within your reach.

(RISC OS) New

ARC-PCB Professional



The ultimate PCB design package developed specifically for the Archimedes is now even better. ARC-PCB Professional follows on the success of the original and provides Faster & Improved Automatic Routing, Oval & Circular pads with fully variable sizes, Faster Redraw, Extended library part manipulation, & Instant Editing operations for substantially increased productivity. This Professional version operates orders of magnitude faster than the original and surpasses all other PC-based PCB design systems in features & speed of operation for the fastest turnaround from concept to finished board design. Take the lead for your PCB designs before your competitors do.

(RISC OS) New

SolidsRENDER

The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations which take into account light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence.

(RISC OS) New

RiscBASIC

The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC" - RISC USER Aug 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. My congratulations to Silicon Vision" - Archive June 1989.

"RiscBASIC wins the race...has the edge overall" - BBC Acorn User Nov 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

(RISC OS) New

All software run in native mode on A300-400 Series & A3000 with RISC OS. Enquire for our free product Catalogue

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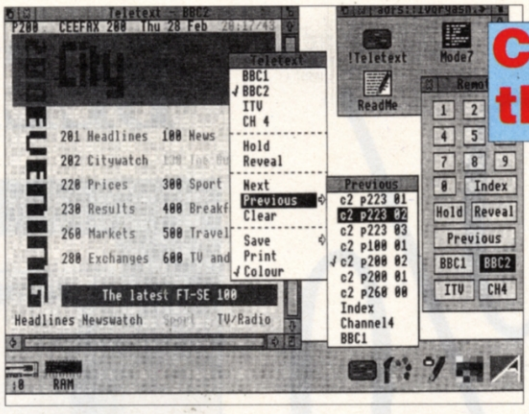
String along with Midi

GUITAR players now have a computer-based music system which will automatically print guitar chord parts from any recorded track played on a Midi keyboard.

This is one of the main upgrades in the new versions of MicroStudio and Studio 24 Plus from Electromusic Research (0702 335747). Existing users are offered free upgrade.



Consulting the Oracle

GEOFF Titmuss of Ivoryash (0684 73173) has produced a multi-tasking teletext display for use with the Morley Electronics Teletext adaptor connected to Archimedes machines.

It shows Oracle and Ceefax in a window on the Risc OS DeskTop letting users to continue with other computer work while the pages they want are being foundr.

This is an advantage over the standard software supplied with the adaptor which is not multi-tasking.

The mouse controlled software offers a 10 page memory in addition to the usual teletext features of hold and reveal.

This allows users to review any of the last 10 pages received. Pages can also be saved either to a file or by dragging into an application.

Stored files can be dragged back into the teletext software for redisplay or printing at a later date. The package costs £15 including postage and VAT.

Geoff also reports that he has now sorted out various bugs in his multi-tasking serial link which allows files to be transmitted between Archimedes machines and BBC Micros.

"In particular, I want to point out that it no longer corrupts the load and execution addresses of files unless they are clearly typed – that is either Text or Basic or BBC rom images", he says.

"It was never intended to adjust other load and execution values but did so because of a case sensitive comparison in Basic".

As suggested in *The Micro User*'s recent review of the product, another new feature allows the control key to be pressed down to avoid spooling the BBC program.

Current users of the link software can get the updated version by sending their original disc with a stamped addressed envelope to Ivoryash at 14 Perwell Close, Bredon, Tewkesbury, Gloucestershire, GL20 7LJ.

New dimensions in flying and driving

THERE's good news this month for those exponents of the wizard prang whose imagination was captured by The Fourth Dimension's flight sim Chocks Away. Now available is Extra Missions, a disc containing 26 new flights.

Loosely based on the original Chocks Away, it features a lot of new features including 16 land and sea-based maps, 20 enemy planes and 20 targets with each mission, improved action and better graphics.

A serial port link option means that two A3000 or Archimedes machines can be joined with two pilots flying simultaneously in full screen mode.

Six reconnaissance missions are included and pilots who complete these can enter a competition to win a remote controlled biplane.

Extra Missions costs £19.95 and a compendium including the original Chocks Away costs £39.95.

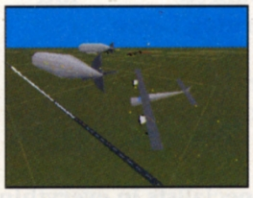
Due out in June from Fourth Dimension (0742 700661) is Saloon Cars, billed as "the ultimate driving game-ulation".

The player starts as an amateur race driver with an Astra GTE challenged to work up through the leagues, buying extra features and faster cars with the goal of becoming Saloon Car Racing Driver of the Year.

Featuring 256 colour, mode 13 graphics designed by a professional artist, Saloon Cars is for the Archimedes and will be controlled by mouse, keyboard or joystick. There are also options for two-machine play and future enhancements will allow even more players. Price has yet to be fixed.

Saloon Cars

Also on the way from Fourth Dimension are Boogie Buggy an original arcade-style Archimedes game costing £24.95, Arcticulate, a speech synthesis package with both male and female voices for £24.95 and Gumshoes, a new windows-based adventure game.



Chocks Away

Thumbs up for X/Open

ACORN have achieved recognition by the independent open systems organisation X/Open.

Beating many larger corporate members of X/Open in the race to produce a conformant product, Acorn have received the seal of approval for their R260 workstation running the Risc iX 1.2 operating system.

It is one of the first BSD 4.3 derived Unix operating systems to obtain X/Open's certificate.

X/Open is a worldwide, organisation formed to establish an applications environment for open systems based on international standards.

Card with a sting

LATEST in the Scorpion series of control computers developed by Micro-Robotics (0223 323100) is the Scorpion K4. No larger than a credit card, the embedded control computer has on-board processing, memory and interfacing which can be used just like an electrical component.

It features a built-in programming language, 32k battery-backed ram, filing system, real-time clock and watchdog and can be used for any product needing microprocessor control.

It costs £102 plus VAT for a one-off and £71.40 plus VAT at 100 off. Development systems cost between £200 and £300

Now available on from BEEBUG

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Finance

at Pre-Budget Prices

A3000 Learning Curve

As well as the A3000 computer, this package includes 1st Word Plus word processor, Genesis educational database and the PC Emulator to run DOS programs.
Also included is a video on how to set-up the computer and information on the National Curriculum.
The Learning Curve is available with the new Acorn Colour Monitor if required.

Learning Curve	RRP	Deposit	12 Monthly Payments
Entry System	£799	£91.00	£59.00
Colour System	£1085	£137.00	£79.00

A420/1 Advanced Learning Curve

As well as the 420/1 with 2Mb RAM and 20Mb hard drive the following items are included: the 1st Word Plus word processor, Genesis educational database, Acorn DTP (Desk Top Publisher) and the PC Emulator to run DOS programs.
The Advanced Learning Curve is available with the new Acorn Colour Monitor if required.

Advanced Learning Curve	RRP	Deposit	12 Monthly Payments
Entry System	£1489	£181.00	£109.00
Colour System	£1742	£194.00	£129.00

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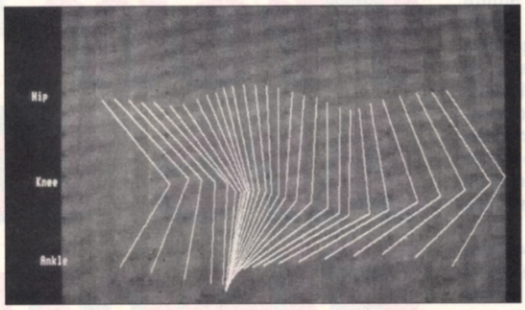

Abnormalities in movement are highlighted for doctors by the Arc

Arc vectoring in on walking problems

CHILDREN suffering from cerebral palsy, adults recovering from strokes and patients fitted with artificial limbs or joints are among the many people who are being helped on the road to recovery by an Archimedes-based system perfected at Aberdeen University.

Developed in the university's bio-engineering department, it highlights any abnormalities in a patient's gait providing valuable information for clinicians and physiotherapists.

The video vector system teams an Archimedes with a genlock board and video camera to show abnormal gait by means of vector lines superimposed on a television image of the patient's leg.

It is the first system of its kind to achieve this real-time display making diagnosis easier for doctors who do not understand the "matchstick men" shown by many other systems.

As the patient walks over a strain gauge platform, data given out by the platform is transmitted to the Archimedes fitted with an Arm 3 chip and running a special software program.

This automatically converts the data into vector lines showing stress and alignment in the lower back, hip, knee and ankle. The video camera filming the patient is connected to the Archimedes via a genlock board.

The system produces an instant picture of the patient's leg superimposed with vector lines allows doctors to assess many patients at one clinical session. It also allows for instant rejection of unsuitable results.

Data is recorded on hard disc so progress or regression can be measured from one consultation to another – often as much as a year apart.

"The system is useful in allowing doctors to gauge the degree of correction needed from such things as splints or braces", said member of th development team Ray Wytch.

"It will tell them how much a joint would bend and whether their treatment is being successful.

"When a person is walking, the foot touches the ground for 0.6 of a second but a lot happens in that time. It cannot be taken in visually but can be seen by freeze frames.

"Other systems are between six and ten times more expensive than this one and editing the data they produce can take up to three hours. That is where our system has a distinct advantage.

"We were the first people to produce a system of this kind but others are now catching up. One is in use in Oswestry and another in Scandinavia, but they are mostly going down the PC route.

"When we started developing this system we thought the Archimedes was by far the best machine for achieving the calculations we needed and we are sticking with it".

A3000 is top of the class

ACORN'S BBC A3000 is now the most popular computer in UK schools and the fourth most popular personal computer in the UK where more than 41,000 were sold last year.

According to independent research carried out by Dataquest, Acorn is now the leading supplier of Risc-based machines to the UK market.

A report just published shows that more than 55,000 machines were sold throughout Britain during 1990 with the A3000 taking the lion's share of 75 per cent.

Since the Archimedes was launched in 1987, Acorn has manufactured more than 110,000 Risc-based machines.

More in Store

MINERVA (0392 437756) have upgraded MultiStore, their multi-tasking database package for Archimedes and A3000 machines.

MultiStore vII works faster than its predecessor and comes in re-vamped package. Existing users can upgrade for 11.75 and the new version comes with a file transfer utility to allow old files to be converted to the new file type.

Fly the flag with flair

IF you're one of those people who can never tell when The Union Jack is the right way up, FranSoft can help.

They have produced two discs of draw files for Archimedes machines containing more than 270 world flags in full colour, including international organisations and maritime signals. A full set costs £10. FranSoft are at 61 Woodland Gardens, London, N10 3UE.

Making Midi music

THIS year's Midi Music Show takes place on the 26-28th April at the Novotel Hotel in Hammersmith, London. The show combines a product-based exhibition by leading music manufacturers, distributors and software companies, with technical seminars covering the whole range of Midi-based applications and techniques.

Midi is now 10 years old and is probably the most significant innovation to hit the music scene, affecting both professional and amateur musicians at all levels.

Over the three days of the show the seminars – which are free of charge – will be running continuously along with full demonstrations of the techniques discussed.

Tickets cost £5 per day on the door or £3 in advance from Westminster Exhibitions Ltd., Surrey House, 34 Eden Street, Kingston, Surrey KT1 1ER.

BBasic expanded

A MAJOR improvement in the TRACE facility and a new HELP command have been included in version 3 of BBCBasic for the PC from Border Computing (05474 368).

Also new are improvements to the BGET#, BPUT# and READ# commands.

BBasic 3 costs £92 including VAT, postage and packing. Existing users of BBasic 2 can upgrade for £24.15 and those with the standard BBasic for £35.65.

From Arc to Electron

Hac man bites into another selection of Acorn game goodies

WELCOME to another column. This month we have a nicely mixed bag of goodies with which to tempt all owners of Acorn machines, particularly the Archimedes and Electrons. However, the usual rules apply – if you particularly want to see something for your computer in this column, get it down on a piece of paper and I'll see what I can do.

In the last few columns we have been looking at the individual components of **Archimedes Repton 3**, and now we are covering the last part – the set of screens originally released for the 8 bit machines as Repton Thru Time.

The passwords for the full set of screens, courtesy once again of Cleone Patterson of Amersham, is as follows:

Level	Prehist	Edit code	Egypt	Edit code	Victori	Edit code	Now	Edit code	Future	Edit code
A	PREHIST	55833	EGYPT	62302	VICTORI	65798	NOW	55178	FUTURE	64195
B	DORMANT	51788	LOBSTER	55913	EARNEST	75730	CHARITY	52088	PRIMATE	61940
C	MINERAL	57255	TABLOID	70938	PERVADE	65672	FUNERAL	45896	MUSTANG	65790
D	VARNISH	58812	ACHIEVE	64435	VIOLENT	59994	JUSTIFY	51760	ITERATE	53679
E	DASHPOT	55748	GRISTLE	60631	BASHFUL	51854	NAUGHTY	57030	CAUTION	59627
F	LOBELIA	61355	DECEIVE	68769	MAGNIFY	54930	ISOLATE	52925	SALIENT	69039
G	UPRIGHT	60068	SCALPEL	52793	WROUGHT	60634	RADICAL	49227	BISCUIT	60141
H	HABITAT	86914	OBVIOUS	59544	HORIZON	58577	KEYRING	68350	EXPLORE	63164

The Latest Greatest Year

Here I present another summary of the Hac Man columns that made up Volume 8 of *The Micro User* – March 1990 to February 1991. I featured similar year-by-year summaries of the contents of the columns of my first three years in the April, May and June 1990 columns. The complete set of summaries are on this month's subscription disc.

March 1990

Skirmish "Upside-down hero" near misprint
Monsters Key redefinition and high-score table editor for all Play It Again Sam 11 versions
Elite Master ram bank modification
Sim Master conversion

April 1990

Sim Extra/infinite lives
Positron Infinite/extra lives and selectable number of aliens and aliens missiles pokes for tape version
Overdrive Variable start level and selectable number of cars to pass to complete level pokes for original cassette version
Uridium Out of production note

May 1990

Citadel Locations of crowns and crystals
Startrader Locations of Armageddon Device segments
Hoverbod Extra lives/level jump pokes
Plan B Infinite energy/ammunition and extra keys pokes for compilation disc version

June 1990

Citadel Endgame tips and infinite energy for Master Compact Sam 1 disc version
Labyrinth Infinite lives for Acornsoft Hits Volume 2 disc version
Arcadians Infinite/extra lives for Acornsoft Hits 2 disc and Master Compact versions
Ravenskull Request for help with level 2

July 1990

Overdrive Pokes amendments for Superior Collection 2 tape and disc versions
Life of Repton Editor codes misprints
Pacmania Final screen display routine and request for pokes for increased difficulty
Labyrinth Infinite lives for Acornsoft Hits 2 cassette
Arcadians Infinite/extra lives for Acornsoft Hits 2 cassette
FireBall II Saved high-score table routine
Codename:Droid Pokes query
Airlift Master conversion query
Caveman Capers Master conversion query
Elite Ram bank relocation routine bugs fixed

August 1990

Castle Quest Hints and infinite/extra lives for disc versions
Alerion Level jump
Terramex Infinite lives
Perplexity Bug fix for 5.25in disc version Master sideways ram problems solved

September 1990

Hoverbod Passwords, monster freeze and level jump
Ricochet Passwords
Clogger Extra-time cheat
Arcade Soccer Clash with Solidisk DFS
FireTrack Infinite lives for Play It Again Sam 7 tape and disc
Zalaga Infinite/extra lives and high-score editor for Play It Again Sam 10 disc
Cylon Attack Mini-upgrade

October 1990

Palace of Magic Competition password
Space Hi-Way or Dune Rider?
Citadel Barrel explanation
Psycastria 2 Cheat mode
Sphere of Destiny 2 Cheat mode
Nevryon Passwords and hints
Perplexity Passwords
Labyrinth Infinite/extra lives pokes, high-

The 144 screens supplied with Archimedes Repton 3 will be immediately familiar to BBC Micro and Electron owners of the Repton series, because they were designed to be identical to the original screens, four colours and all. However, the Archimedes version uses a screen mode which allows 16, completely definable, colours and the editor is designed accordingly.

Like many of Superior's products, the release of the Archimedes Repton 3 package was accompanied by a competition to design the best set of screens. The winner, Chris Fox from Monmouth, has redesigned all the original Repton 3 screens to take advantage of the 16 colour display, so any Archimedes owners who have not already bought it will be in for a treat.

Back on Stryk

Although Ol' Greenskin's adventures are tremendously enduring, another game that keeps generating fan mail when – like its contemporaries – it should be long forgotten is Superior's **Stryker's Run**.

Over the years I have written routines to provide infinite and extra lives on the various BBC disc versions, so it is about time that Electron owners were welcomed to the fold with a dose of the same.

Like their BBC Micro counterparts, the Electron cassette versions of Stryker's Run are pretty well protected, so these routines apply to the disc versions as featured on Play It Again Sam 1. Listing I provides infinite lives on the 5.25in disc version, while Listing II is for the 3.5in Plus 3.

As all BBC Micro hackers and hackettes will know, you should type in the appropriate routine exactly as shown and save it on to one of your own blank discs under a suitable filename, **not** on to the original Play It Again Sam disc. Now type RUN and follow the instructions.

```
10 REM Stryker's Run infinite lives
20 REM Acorn Electron Play It Again
Sam 5.25" disc version
30 REM by Hac-Man 1991
40 REM (C) The Micro User
50 REM
60 oscli=&FFF7
70 FOR I%=0TO2STEP2:P%=&900:[OPTI%
80 LDA#&60:STA &A99:JSR &A00
90 LDA#&A5:STA &1D1A \inf. lives
100 JMP &6200
110 ]:NEXT
120 PRINT"PLease insert Sam disc an
d press any key...";:*FX15
130 A%=GET:*INIT
140 MODE 2:VDU 23,1,0;0;0;0;:*LOAD
RUN
150 CALL &900
```

Listing I: Stryker's Run infinite lives for Acorn Electron Play It Again Sam 5.25in disc version

```
10 REM Stryker's Run infinite lives
20 REM Acorn Electron Play It Again
 Sam 3.5" disc version
30 REM by Hac-Man 1991
40 REM (C) The Micro User
50 REM
60 oscli=&FFF7
70 FORI%=0TO2STEP2:P%=&900:[OPT I%
80 LDX#cli MOD256:LDY#cli DIV256:JS
R oscli
90 LDA#&A5:STA&1D1A:\ inf. lives
100 JMP &6200
110 .cli EQUS "LOAD RUN"+CHR$(13)
120 ]:NEXT
130 PRINT"PLease insert Sam disc an
d press any key...";:*FX15
140 A%=GET:*MOUNT
150 MODE 2:VDU 23,1,0;0;0;0;
160 CALL &900
```

Listing II Stryker's Run infinite lives for Acorn Electron Play It Again Sam 3.5in disc version

score editor and fire key redefinition for Acornsoft disc version

November 1990

Orbital Upgrade for tape and disc versions
Sabre Wulf Disappearing guard bug and fix for clash with Spellmaster
Ravenskull Solution to level 2 – part 1

December 1990

Hac-Man high-score table – Third round
Golden Figurine Infinite energy and Master conversion
Ravenskull Solution to level 2 – part 2

January 1991

Archimedes Repton 3 Original Repton 3 screens passwords
Krakout Level jump
Stryker's Run Re-run of pokes for Play It Again Sam 1 5.25" disc versions

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Superior News of 32-bit Speech! and 8 bit Sams 15 and 16
Ravenskull Solution to level 2 – part 3
Archimedes Repton 3 Passwords to the "Around the World in 40 Screens" screens and explanation of edit codes
Around the World in 40 Screens Solution to screen F of America

Power to the people

I recently spent a week with friends in Germany, where lots of bier and wurst were consumed and a generally good time was had by all. One of my travelling companions was **The SimCity Planning Commission Handbook**, a 200-page book that complements the current flagship of the Superior collection.

The author, Johnny L. Wilson, is the editor of the American games magazine *Computer Gaming World* and an avid Sim City player. Consequently, the whole book is brimming over with enthusiasm – a pole apart from the "I know a lot about this subject and so therefore I am qualified to write about it" style that cramps so many technical publications.

Just as Sim City itself is much more than just a game, the Planning Commission Handbook is more than just an accompaniment: It makes for fascinating reading in its own right and appeals to both the computer programmer and the economist in me.

With my programmer's hat on I marvel at the depths of Sim City, both in terms of the extraordinary vision that must have been needed to create such a unique simulation and also in terms of the construction and destruction facilities it offers the closet megalomaniac. The instructions supplied are adequate for the purpose of playing but do not do justice to the full power and flexibility of Sim City.

On the other hand, with my one-time A level Economics student's hat on, it is precisely the sort of textbook that we never had at school. Packed with witty comments and appropriate paragraph headings, such as "Whole Lotta Shakin' Goin' On" and "It's Not My Fault" when the topic of discussion is earthquakes, it positively forces the reader to want to learn about urban planning.

The book opens with loading instructions for a number of different machines but, as it's an American book, the Acorn machines are not among them. Next comes a detailed explanation of each of the icons used to construct the simulated cities. Then it dives headlong into the gentle art of city building itself.

This starts with a detailed history of how town planning evolved over the centuries and millennia, and the factors that caused certain towns and cities to evolve the way they did. Next comes discussions of specific problems, such as overpopulation, traffic congestion and unforeseen disasters.

Each one details the way Sim City represents the specific problem and what can be done to tackle the cause in an effective way.

Throughout the book the author documents common mistakes that he himself made as a novice mayor, with recommendations of how the reader can best avoid falling into the same traps.

He also details how it can be stretched beyond its intended limits to include functions such as schools and waste disposal facilities that are part of communities everywhere but not provided for in Sim City as it stands.

The only minus point that I can find to pitch against the book is that it only specifically covers the versions released for the American machines such as the PC and the Apple Macintosh.

However, although all costs discussed in the book are represented in dollars, the basic principles apply equally to the

➤

Acorn versions. Indeed, the San Francisco 1906 scenario covered in some depth is supplied as part of the Superior package.

To conclude, The SimCity Planning Commission Handbook is an absolute must for anyone serious about enhancing their skills of mayorship. The enjoyment that the author obviously had in writing it positively oozes from every page and its potentially dull subject has been invested with a lot of life. It can be ordered from any good bookshop.

● *See you next month, when I will once again be featuring all that's fun to play in the Acorn scene. Happy gaming!*

A Basic problem

I was recently speaking to Superior's Steve Hanson about life, the universe and computer games, and he has informed me that the generally-released version of **Sim City**, is not fully compatible with early BBC Micros that are still running Basic 1.

If anyone is experiencing loading problems, particularly if they receive the tell-tale message *Syntax error at line 150*, they can check the version of Basic by pressing Control+Break and then typing REPORT plus Return.

Basic 1, as supplied with early machines, will report the message *(C)1981 Acorn* while the much more common Basic 2 will report *(C)1982 Acorn*. Later machines, such as the Master series, will report copyright dates later than 1982. If your machine does have Basic 1 please contact Superior and Steve will gladly replace your version with that for Basic 1.

Alternatively, the Basic 2 chip and manual are still available from most good chip shops, notably Watford Electronics, and I would certainly recommend this as the better choice. I admit that as a programmer I am biased, but the extra facilities that were added to Acorn's second version of Basic give it a nice programmer-friendly feel that Basic 1 never had.

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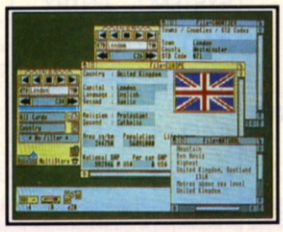

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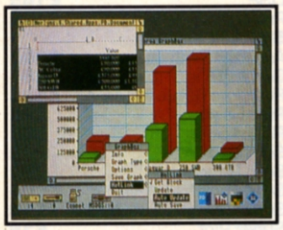

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Teri Paul assesses the latest in the PD world

PUBLIC DOMAIN

WHAT an amazing flood of new PD software has descended this month, not only some very nice programs for individual programmers but new PD libraries have started up too.

If you like to add a little humour to your icon bar I can offer an interesting selection. **Woolly Jumper** is quite seasonal as a nice fluffy sheep takes up residence on your icon bar and bounces up and down happily.

You can increase or decrease the number of his jumps too – blame Richard Hallas for this one, not me.

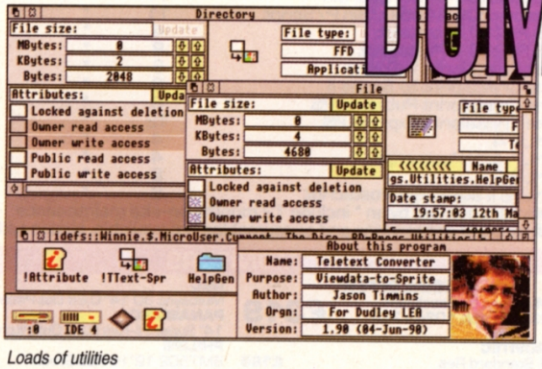
In the same vein comes **Fred**, a cute little squatter you can send to sleep or even tell to leave. He will also crop up on system messages, but is quite understanding when you evict him.

Thank you for answering my plea for DeskDuck+, he has appeared courtesy of Acorn's Caring for Children disc. It's not PD – you must buy a disc to acquire him, but it is in a good cause. You are able to send said duck to sleep as well as having him feeding and diving. **Troll** is not as exciting, as all this little hooligan does is stomp up and down your icon bar hammer in hand. He's not window-based, so he'll wipe out anything he walks over.

I'm not quite sure what to do with Azimuth – but if you've always wanted a multi-tasking random limerick generator this is for you. I refuse to take responsibility for bad, contrived or non-scanning lines.

With graphics in mind

I'm a bit loathe to include demos on the monthly disc, but Cubitos courtesy of RML (hmm, a bit of a conflict of names there) must be an exception. I wish I knew why the best demos come from every other bit of Europe but the UK, in



Loads of utilities

Silly bits

Seriously speaking

On a more useful note, some very nice utilties have come my way. **HelpReader** in particular is excellent. It is a standalone application for reading help files without having to load Edit or dive for Control+Shift. Written in ARM code, it is very space conscious and easy to use.

All you have to do is take your application to the MakeHelp icon on the bar and the rest is done for you. We had some problems with this utility when using an IDE drive and occasionally it gives a channel error.

Ben Summers also sent me an FileUtils version 3.03 which has some nice improvements, including a find file enhancement which can search in Spark archives.

ArcFS has cropped up from a couple of sources – including the author – as a replacement for SparkPlug, unfortunately it also has problems if you have (like me) an IDE hard drive.

We won't be using it until conflicts are ironed out, but I'll describe it anyway. It allows you to load and open compressed files from within an archive as if it were just another filing system, so there would be no need to use ram discs for unpacking. **Attribute** is an extremely useful information program. Take any file to the icon bar, drop in on the icon and you be told its access, size, type and date.

this case Bavaria.

Not only is it humourous, well programmed and features good and colourful graphics and animation – but it only takes up 175k.

Aquarium is a extension to the fish which live on your DeskTop. Instead of having just a backdrop on your desktop you can have an animated aquarium with bubbles and variable amounts of fish. Watch out for future enhancements such as an option to feed your fish as well as an opportunity to introduce new species to your fish bowl. By the way, you can have an alternative on your desktop – sharks.

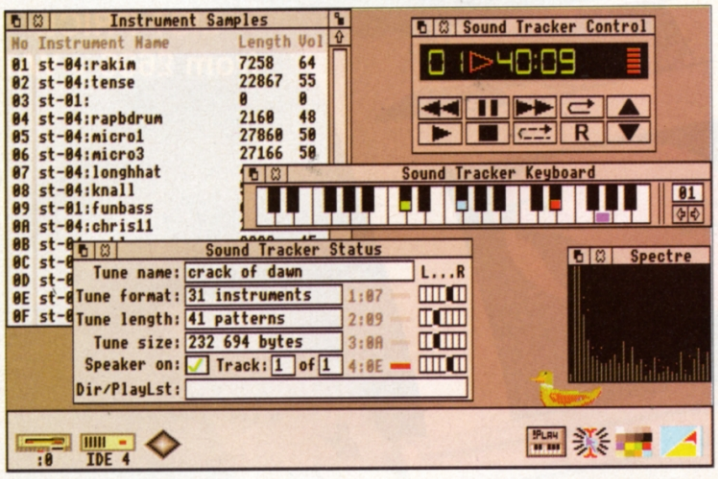
If you have access to teletext you'll realise what a useful source it can be. But if you've managed to acquire a Mode 7 screen you could find problems getting it into a useful form for work on an Archimedes.

TText-Spr is a teletext to sprite converter written by Jason Timmins, which takes 1k teletext chunks and converts them into Mode 9 Archimedes sprite files.

Simply drop your Mode 7 screen on the icon, drag the sprite file to a filer window and, hey presto, you have a useful sprite which can be used in other documents or DTP work.

Sounds good

PlayerMod is an advanced desktop player of SoundTracker modules. You can choose to have a keyboard window playing the notes of your track, or a spectragraph as well as status with instrument breakdown, tune length in patterns and other useful information.



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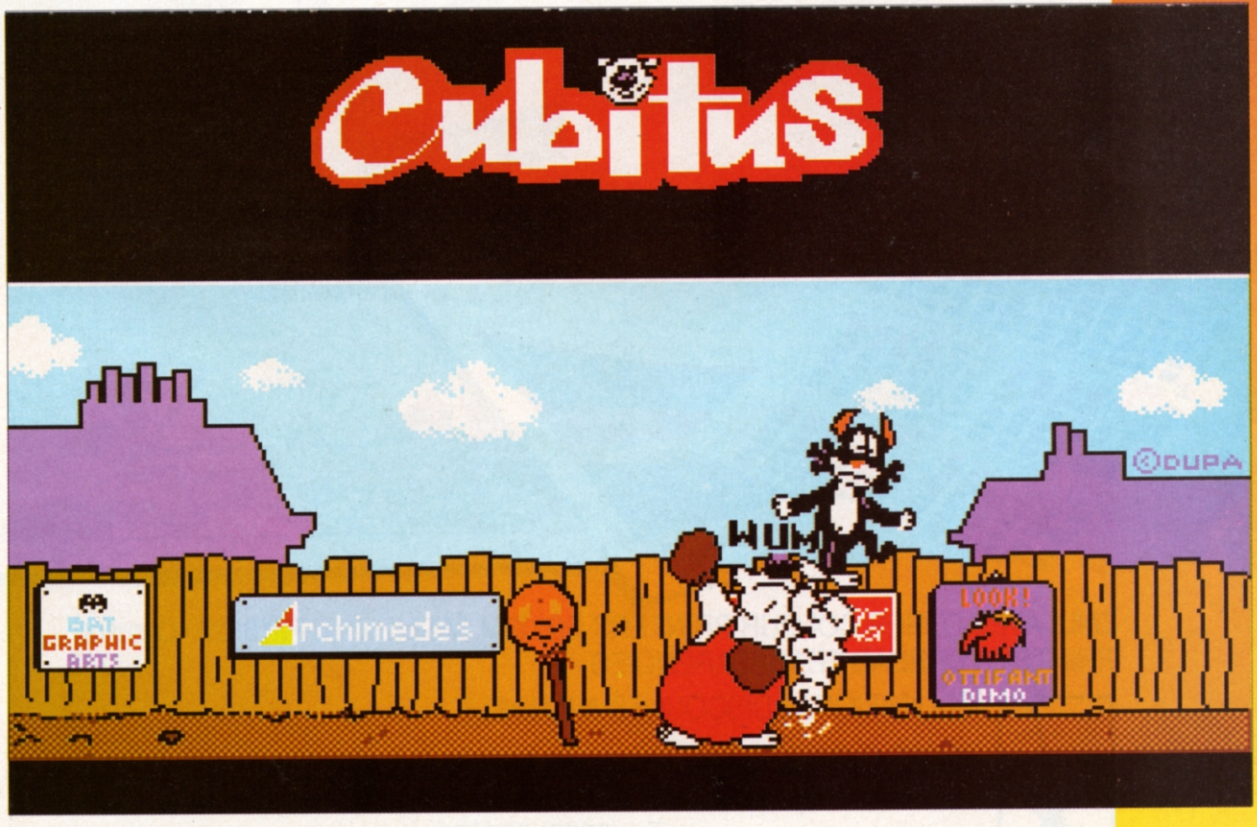

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UPDATE

Compression pays

SCHOOLS around the country are now seeing the advantages of high data compression on CD rom as deliveries start under the Times Network/Toshiba CD Rom Initiative.

The Times Network Systems are the company responsible for reproducing back copies of The Times and The Sunday Times on compact disc and they have joined with Toshiba to offer schools a useful package of CD Rom material at a special saving of more than 1,200.

It includes the Toshiba XM-2200 CD rom disc drive complete with cables, drivers and interface cards and a year's subscription to the new Times/Sunday Times Compact Disc Edition which holds the full text of both papers for 1990 and will include 1991.

Also in the package are a year's subscription to ECCTIS CD Rom – a Department of Education and Science information service on education and training courses in the UK and the NERIS CD Rom – and the National Educational Resources Information Service disc with information on a wide range of curriculum and education resourses in the UK. Rounding off the package is a disc containing all 21 volumes of the Academic American Encyclopaedia.

In all, the Archimedes-based package would normally retail at more than £2,000 but through the initiative, schools can get it for £795 plus VAT. The offer is being supported by the National Council for Educational Technology and runs until July 31.

Schools interested in the project can contact The Times Network Systems on 071-782 7143.

Read with Maggie

THE Glaswegian firm well-known for their creative educational software, Scetlander (041-357 1659), have teamed up with a new character, Maggie the Monster, for their new pre-reading skills program Mix and Match with Maggie.

Maggie helps the very young to recognise, discriminate and remember pictures, shapes, letters and numbers and can also be used by older students with learning difficulties.

The program is divided into three main sections each with six educational games and includes sound effects and simulated speech. The Archimedes version also incorporates the Scetlander clock and calendar as useful extras.

Programs can be customised to suit all abilities and results may be recorded, retrieved and printed in a manner to make assessment relatively easy.

For Archimedes and A3000 machines, Mix and Match with Maggie costs £24.99.

Getting started with Maggie from Scetlander

Mastering parks data

OUR National Parks is an information technology package designed specifically for the Master range of computers by Sunnyhurst Software.

Its main purpose is to provide educational details about the National Parks of England and Wales and schools buying it can help the work of the Council for National Parks which receives a donation from the £8.50 cost of every pack.

The database includes general information about the parks, specific details on each one and other data on related topics. It is accessed and displayed in teletext fashion by keying in a three digit numbers.

Our National Parks is designed to cover attainment targets 2, 4 and 5 of the Geography curriculum at levels 3 to 6. It can also relate to other technology, geography, English and maths attainment targets. Sunnyhurst Software are at 3 Sunnyhurst Cottages, Darwen, Lancashire, BB3 1JX.

School package helps police

ONE of the most successful educational packages from Cambridgeshire Software House (0480 67945) is now being widely used to cement relations between police and schools.

Police - Language in Action was originally developed for schools but Brian

➤

Nstore updated

TEACHERS and education advisers who used the original Nstore package from HS Software (0792 204519) came up with some suggestions for improvement. The result is Nstore 2, an updated Archimedes and A3000 version.

It is designed to lighten the load of record keeping imposed on teachers as a result of the National Curriculum. Among the new features incorporated into this latest version is the transfer of class data between discs – a useful facility for when children transfer from infant to junior or from primary to secondary school.

Also in the new version are the option of selective updating for individual children files as well as class files; improved printing options; block data entry for Statement of Attainment groups and complete levels; fast and comprehensive search for children who have achieved specific Statements of Achievement; improved ranking and alphabetical sorting.

Subject specific versions are also available for secondary school teachers including levels 1 to 10 in various core subjects. One for science is already out and others for Maths and English are due shortly.

Nstore 2 costs 29.95 but existing Archimedes users can upgrade by returning their original disc with a cheque for £5.

Richardson of CSH reports an interesting spin-off with many police authorities seeing the package as an ideal ice- breaker for their school-based community work.

West Midlands Police are just embarking on a project involving the program and there have also been overtures from The Met at New Scotland Yard. Other authorities who already use it include the Thames Valley and Cambridgeshire forces.

"The package has sold extremely well into schools but it has surprised us how many police forces have used it to introduce themselves to educational establishments", said Brian.

"It has led to a lot of interesting anecdotes. Youngters have gone into magistrates courts to see what happens there and in Camrbidgeshire, the police actually staged mock accidents to children could see how they are dealt with".

Police - Language in Action allows the classroom to become an active police station while the children solve the three crimes and 30 other incidents which happen during a simulated week.

The BBC Micro acts as the control centre with databases to be searched for vital clues and the package includes an audio tape of eye witness interviews plus a set of colourful town plans, photofit pictures and crime prevention posters. It teaches children the importance of correctly recording details, audio and visual discrimination, decision making and teamwork. Price, £38 plus VAT.

While Police is designed to make life more fun for pupils, the latest CSH package called Continuum aims to make it better for teachers. For Archimedes and A3000 machines, it's an integrated system which draws a thread through the planning, assessment, recording and reporting stages of the National Curriculum.

Dealing with key stages 1 and 2 of the National Curriculum for English, maths and science, Continuum will hold the individual records of more than 800 pupils. It costs £49.95.

New Key datafiles

ANGLIA Television's education department have announced a series of new datafiles which can be used by schools with the Key data handling system and the special Archimedes system Key Plus.

More than 30,000 Key systems have been sold for use with ITV schools programs, but the new datafiles have been launched as an added teaching resource not directly related to broadcasts.

Forming an important aid for science teachers, the Earth Sciences series has be completed with the release of new files entitled Energy, Leaving The Planet and Our Neighbours In Space.

They join the existing files Rocks and Minerals and Weather and Climate and are already available for standard KEY packages with the upgraded Key Plus versions imminent. The datafiles come on disc with supporting printed materials including student information sheets, guidance notes and worksheets.

Two more files have also been added to the Fiction Files series. Fiction File Middle 1 is designed for school library use in the middle school age range and Fiction File Lower 1 meets primary school needs. They have been produced in association with the Bedfordshire Schools Library Service.

Files can be customised to meet the requirements of individual schools; new information can be added and different levels of file can be amalgamated.

"There is now a wide range of datafiles available from ITV Schools and a considerable number of files being produced at IT centres throughout the country", said Anglia's education officer Peter Stibbons, who manages the KEY and KEY PLUS projects. "We also have a number of other exciting projects in the pipeline, particularly using the greatly expanded capacity offered by Key Plus".

Archimedes and ecology

WHEN pupils who have been on fieldwork studies get back to the classroom they are faced with the problem of displaying the data they have collected. BBC Micros have helped solve the dilemma for many years and now Archimedes machines have also been brought in to help.

The Advisory Unit for Microtechnology in Education (0707 265443) have just launched an Archimedes version of Ecosoft, their program for processing data from ecology fieldwork.

Ecosoft can display data as diagrams, do statistical calculations, display profiles of land and water, produce sets of co- ordinates for random sampling and even indicate the level of pollution in ponds or streams under the Trent Biotic Index.

If you want to get really complicated it also calculates Spearman Rank Correlation Coefficients, Greig-Smith's Block Size Analysis of Variance and species diversity under the Shannon-Wiener Index.

With National Curriculum applications for science, geography, maths and technology for key stages 2 to 4 and A Level, Ecosoft for the Archimedes costs £35.

Also new from The Unit is Storyline, a database created for children by children. Over a two year period, pupils from various secondary schools have collected details of more than 700 fictional books they have read. Information from them has been collected together in the Storyline database which can be searched or edited using either Quest or Oriel.

The data includes author, title, publisher, date of publication, keywords, a brief story outline and useful notes. Storyline comes in a pack with data discs and a booklet describing the history of the collection, curriculum use and technical notes. Available for BBC Master 128, Archimedes and BBC A3000, it costs £35.

Rounding off latest releases from The Unit is a new version of the Dart language – a subset of Logo. Dart Plus includes nine extra commands which, together with the existing commands, meet the National Curriculum requirements in Maths, Technology and English.

Using the language, pupils can learn to draw pictures on their computers. It is available for BBC Micros, Archimedes and BBC A3000 machines. If the computer has a user port, Dart Plus will control a Jessop floor turtle and the BBC Micro version will also support the Valiant turtle and the BBC Buggy. A site licence costs £25.

Help for parents

THE world's first computer comic – *Let's Compute!* – is already well known for the way it makes learning computing fun for children. And now the magazine is going a step further by giving tips for parents and teachers wanting to help them.

Every month, starting with the April issue, there will be a feature for the adults. It will tell parents and teachers how the articles and cartoon strips fit the National Curriculum and also give ideas for further exploration and investigation for the children.

"Programming is part of the National Curriculum, and the simple games and other programs we print are an ideal starting point for learning what computing is all about" said Peter Davidson, editor of *Let's Compute!*

"Our programs are designed so that they can easily be modified by the youngsters themselves. They should be encouraged to adapt the software in ways so that it reflects their own ideas and their own personality.

"Investigation is another important element of the National Curriculum. Most of our pages are designed with this in mind and point children in the right direction to discover things for themselves.

"The Parent and Teacher feature helps them give the children the personal encouragement that no magazine can possibly offer. It gives ideas for further investigations and offers suggestions for how programs can be adapted".

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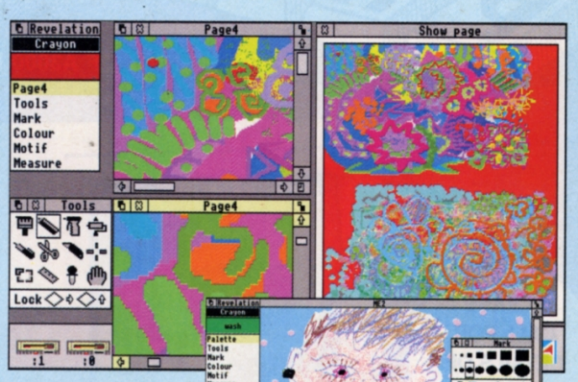


Working at different zoom scales

Art of gold

Tear off menus

Steve Bruntlett is bowled over by the quality of a new painting program

REVELATION is a brand new Risc OS painting package developed over the last two years at Homerton College which also produced the highly successful Image program for the BBC Micro.

Revelation includes options for sophisticated image processing and cross-curricular work as well as a comprehensive range of art and design tools.

While aimed at the education market, and priced accordingly, it is very suitable for anyone who wants to produce art rather than pictures that have the machine look.

Its low cost doesn't reflect the fact that this is a very sophisticated piece of software. In such a short review I can only give a flavour of Revelation, but having used it with art and design students for a couple of sessions I can say that it's very straightforward to work with and that the potential in using such a package for image creation and processing is enormous.

It runs in the normal Risc OS multitasking environment with all the resultant benefits, as well as operating in any mode at any size of page up to the capacity of your machine. The package includes a single disc and an excellently illustrated colour A4 manual.

The disc contains a !System merge application, the program itself, a couple of fonts and Revelation Extra which allows you to take snapshots of part of any screen displayed on your machine such as !Drawfile, digitised or scanned pictures and drop them into Revelation for further work.

Loading is simplicity itself and like most other Risc OS applications, the program resides on the icon bar until accessed.

By using the middle mouse button you can access the Revelation menu and change the use of the mouse and menus from right to left handed.

As well as being able to operate the menus as in any Risc OS application you can use the special Revelation tear off menus.

This is the preferred mode of operation as it allows you to drag menus to the edge or other parts of the screen for reference while working on an image, rather than having to pop up a menu every time you want to change a colour or tool.

To start work you create a page by clicking on the Revelation icon. It can be of any size using centimeters, inches or sheet sizes.

The default page is a quarter of a screen in size but you can create larger or smaller pages by dragging one of the three control ears to a new position. This is placed inside a page window and the main menu presented at the top left hand corner of the screen.

The page window can be resized and accessed using the sliders. You can have up to eight images in the process of development at the same time. The Page menu offers Last Change, Undo and Zoom facilities at eight magnifications as well as Show page, which is useful if you are working on a larger than screen image and want to see the whole image at once.

It also features a Colour Shift submenu which is the heart of the image processing element of Revelation.

The Colour Shift dialogue box allows you to change any of the tint colours on screen with RGB sliders, to adjust from fully saturated colours to a grey scale, and to shift the image towards black and white or towards the colour average of the page controlling contrast.

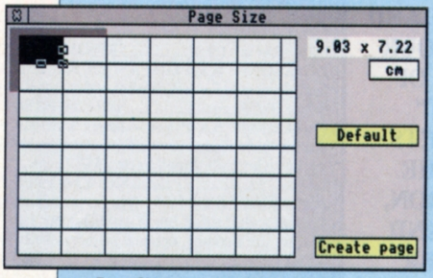
A threshold step slider determines the threshold between black and white when using edge effects, and a negative colour option makes this a fascinating and extremely powerful tool for image processing.

Hardcopy output is via any resident Risc OS printer driver and images can be enlarged, reduced or turned sideways. Saving the page is the final option on the Page menu. There is no compression routine to save disc space as far as I can see.

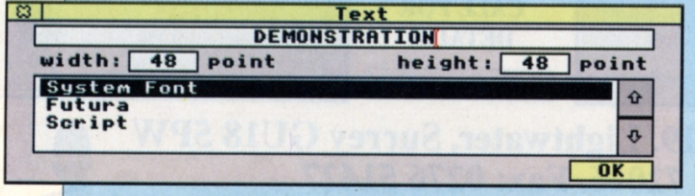
The Tools menu offers the usual range of brush, crayon, spray, fill roller, drawing pen, scissors for rectangular areas and knife for irregular areas which also have a shrink option.

The paste registration tool controls where and how you place the cut image and offers supplementary options for locking, flipping, rotating, scaling and blending.

An edge effects tool has options for tracing, blending and blurring with three levels of



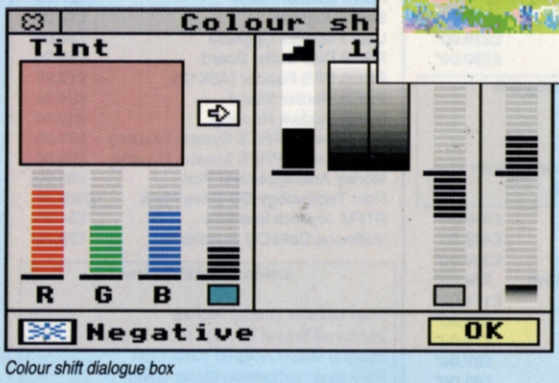
Page Size



Text option

Pattern option

Motif menu



Colour shift dialogue box

sensitivity. The pick tool allows you to select colours from the screen for matching or from a torn off colour menu mixing palette. Very useful.

The mark menu offers a range of square and round marks to work with plus a mark editor with which to produce your own mark of any proportion or size based on a square or circle.

The colour menu looks quite normal with a neat display of the standard 256 colours in Mode 15 but there are also eight wash colours which allow blending of colours on the white palette area beneath the block of colours.

These allow you to produce subtle mixtures which can be washed over up to half a dozen times before they become completely opaque. So if you wash over yellow with the red you can make it anything from slightly orange to deep orange with successive strokes.

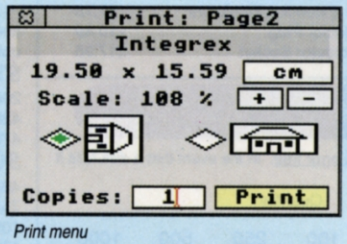
The motif menu gives control over cut areas of the screen or colour palette and allows you to save these in a motif directory and also to use them in the pattern option which has vertical and horizontal controls.

The motif menu also gives control over any outline or bit mapped fonts you may wish to use producing text in any colour, degree of transparency or point size.

The ruler menu allows you make measurements from images and also to configure the measurement facilities associated with the drawing painting and collage tools. This is where Revelation starts to have cross curricular uses, as it gives precise measurement control of any element of an image.

Using scanned maps, for example, you can work out the area of fields, the length of roads and rivers, distances and take bearings from one point to another using set or custom units of measurements. You could work on golden section theory on scanned old masters. There must be many other uses for this option. Wonderful stuff.

Tool Menu



Print menu

Mark menu

Some of the results you can get

Summing up

This is the most exciting art package that I've seen in years. What makes Revelation special is the wonderful image production and processing facilities offered and its potential use in many other subject areas in schools such as maths, geography and, eventually, science.

The single images illustrating this review are examples from schools. The images on the screen shots were produced by my students during their first session with Revelation. If you are at all serious about making images on a computer you must buy this package. Miss it at your peril.

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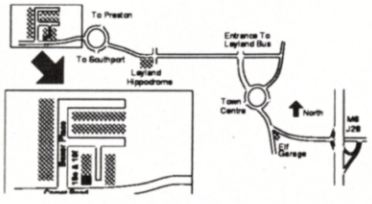

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Putting in numbers

Product: Pigeonhole
Price: £13
Supplier: Northern Micromedia, Resources Centre, Coach Lane Campus, Newcastle upon Tyne NE7 7ZA.
Tel: 091-270 0424
Requirements: BBC B, B+ and Master

Rog Frost explores an easy introduction to spreadsheets

PIGEONHOLE is described as a *first spreadsheet*, a description which could fill you with forboding. After all, many people still think that spreadsheets are solutions in search of problems.

However this package will give even the most diehard, non-computer literate teacher few worries. It is easy to use with clearly defined and simple aims and achieves most of what it sets out to do very well.

Data is entered on a grid which looks just like a spreadsheet but I certainly wouldn't describe it as such – it has no cell referencing facilities and data can only be entered into each slot as words or numbers. There is no facility to do calculations; in fact the program is rather more like a database.

You can have a maximum of 15 columns, each given a title. These are database field names. Each row – up to 35 – on the sheet is a database record and the left hand column is used to label each record. Column and row titles stay on the screen at all times. The space for each piece of data is limited to 10 characters – rather meagre in practice.

Potentially more of a problem is the inability to extend a sheet once its format has been created. The handy little manual does suggest setting up dummy rows and columns for future expansion. Entering data is easy – move the cursor to the required slot and type in what you require, hitting Return to finish the entry. All data is displayed in clear, double height characters with sensible use of colour.

Having entered information, a number of options are available. Any column can be sorted into numerical or alphabetical order. Searches can also be carried out and the result printed.

Mathematical facilities are limited to totals and averages. Any column or row can be treated by these options.

As most teachers would expect, there is a graphing section. This has been implemented very well and allows for bar charts, which show actual values of numerical data, or pie charts which show the information within ranges.

Both graph types show what is needed on screen. They can, of course, be printed on Epson-compatible printers, with printouts either in shaded or outline forms.

File management is easy. Completed sheets are saved on the program disc and may be printed easily. They can, of course, be re-loaded and edited.

Pigeonhole comes with a couple of paper resources in the form of photocopy masters. These consist of a suitable sheet for collecting data and a blank spreadsheet for planning.

I would like to see a couple of extra facilities – the ability to extend the structure of a spreadsheet and an option to save screens for colour printers.

Summing up

Pigeonhole is brilliant. It uses a more natural way to store and display data than a conventional database and produces first rate graphs. This program is a real snip for all primary and secondary schools.

Entering data is easy

Graphically speaking

Rog Frost assesses the Archimedes version of Numerator

Product: Numerator
Price: £66.00
Supplier: Longman Logotron, Dales Brewery, Gwydir Street, Cambridge CB1 2LJ.
Tel: 0223 323656
Requirements: BBC A3000 and Archimedes series

WHEN in1989 I reviewed the BBC version of Numerator I had some reservations about the software. In part, this was due to a slightly difficult user interface and the fairly poor quality of the screen displays.

Now, in the 32-bit version, the program is just superb. Numerator is a fully Risc OS program which means it follows the same rules as most other good Archimedes software. If anything, the icon-based menu is a step up on many other programs.

The basic idea of the program is that numbers and mathematical operations are stored in tanks. A simple example concerns a VAT calculator. The initial price and the VAT rate are placed in two separate tanks.

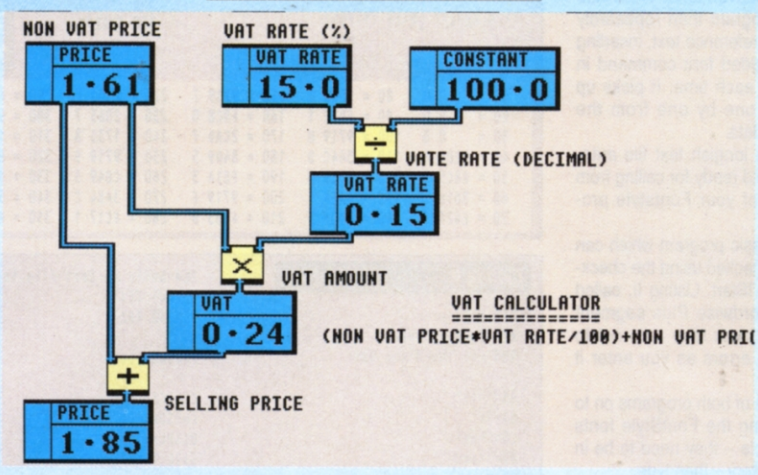
These are linked by suitable pipe work and operations to produce the amount of VAT to be levied and then the final sum.

This simple example could be produced on a spreadsheet. The advantage is that the whole process has to be broken down into single, understandable operations. The idea of tanks and pipes produces the idea of numbers flowing and appeals to children.

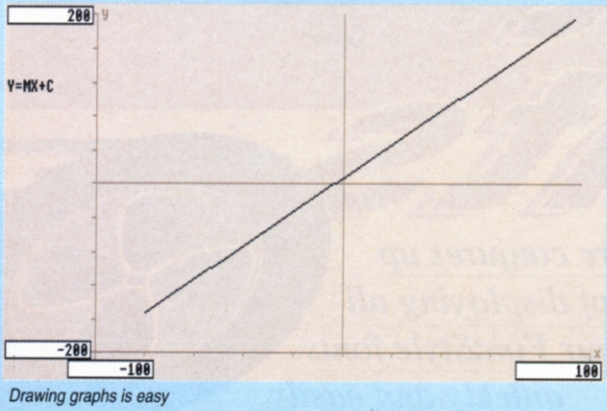
Every part has been improved to take advantage of Risc technology. The graphs and charts are fast and well drawn. It is a pity they cannot be treated as standard sprites for transfer to other programs, though this can be done using 4Mation's Snippet.

An adequate text editor can allow for good documentation – essential if students are to make effective use of the software. This enables good quality printed worksheets to be produced too.

The handbook has undergone similar radical improvement. The most noticeable change is the reduction from 200 pages to 60, which speaks volumes for the simplification of the user interface. If, like me, you had doubts about the 8-bit version then have no fears. Archimedes Numerator is a first rate educational tool.



Clear representation of calculations



Drawing graphs is easy

A wide choice of operations

Fast fonts

Ray Favre conjures up a way of displaying all your FontStyle fonts quickly and easily

IF you've bought the excellent FontStyle package you'll probably have found that the full selection – more than 60 – a bit overwhelming, so a printout of what each font looks like would be very useful.

With such a huge number to deal with the simple way of listing them would have been terribly tedious: Typing out the reference script once for each font with just the embedded font command changed looks like a job for the Wordwise Plus programming language.

All we have to do is read the font disc catalogue into a safe place using the Osgbpb call. A conventional Wordwise Plus segment program then repeatedly types the chosen reference text, inserting a different embedded font command in FontStyle format each time. It picks up the font names one by one from the stored catalogue data.

The result is a longish text file automatically saved and ready for calling from the Print option of your Fontstyle program.

Listing I is a Basic program which can be typed in and checked using the checksums. Save it as !Start. Listing II, called SegOne, is a Wordwise Plus segment program, so you must take care not to make any typing errors as you enter it using Wordwise.

Transfer copies of both programs on to the disc containing the FontStyle fonts you want to sample – they need to be in their usual F directory – then type:

```
CHAIN"!START"
```

and sit back until the job is done. Your disc will now have an extra file on it called FontDis which can be called from the FontStyle print option and will then print samples of all the fonts on the disc.

Listing I:

```
10 REM FontStyler
20 REM by Ray Favre
30 REM (c) The Micro User
40 PROCinit
50 *DIR F
60 PROCcat
70 *DIR $
80 PROCquit
90 END
100 :
110 DEFPROCinit
120 DIM b%32,c%256
130 O%=OPENOUT"FileLst"
140 ENDPROC
150 :
160 DEFPROCcat:LOCAL f$,g$:F%=0:G%=0
170 REPEAT g$=f$:f$=FNgf
180 IF f$<>g$ PROCout(f$)
190 F%=F%+1:UNTIL f$=g$:ENDPROC
200 :
210 DEFFNgf:LOCALA%,X%,Y%
220 ?c%=0:c%!1=b%:c%!5=1:c%!9=G%
230 A%=8:X%=c%:Y%=X%DIV256:CALL&FFD1
240 G%=c%!9:b%?(?b%+1)=13:=$(b%+1)
250 :
260 DEFPROCout($c%)
270 FOR L%=0 TO LEN$c%
280 BPUT#O%,c%?L%:NEXT
290 ENDPROC
300 :
310 DEFPROCquit
320 CLOSE#0%
330 *KEYO*Wordwise|M:SE.SEG.1|M:LO.TE.
"SegOne"|M:SE.TEXT|M*FX138|M*FX138,0,145
|M
340 *FX138,0,128
350 ENDPROC
```

Get it right ✓

```
10 =     0 0    80 = F34D E   150 = 9719 7   220 = 21E9 7   290 = ED0F 9
20 =     0 0    90 = FD2E 1   160 = F9C8 0   230 = 2065 7   300 = 9719 8
30 =     0 0   100 = 9719 B   170 = 2CAD 7   240 = 1735 8   310 = 19BA C
40 = DEBB B   110 = 344C B   180 = 84D9 5   250 = 9719 9   320 = EDD7 3
50 = A8C5 3   120 = 4DE9 0   190 = FE1A 3   260 = CB49 5   330 = 58FC E
60 = B616 3   130 = 4AE4 1   200 = 9719 F   270 = 3A84 C   340 = 5DEC 6
70 = E421 7   140 = ED0F 3   210 = 48B3 B   280 = FC17 1   350 = ED0F 9
```

Listing II:

```
REM SegOne
REM by Ray Favre
REM (c) The Micro User

A$="<fo"
B$=">"
C$="<ex1>"
D$="<ex2>"
E$="<ex4>"
G$="<nh>"
H$="<dh>"
M$=" abcdefghijklmnopqrstuvwxyz
0123456789 "
N$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
X$=CHR$(13)
J$=C$+G$
K$=D$+H$
REM Get file list
SELECT SEGMENT 2
LOAD TEXT "FileLst"
REM Build up text file in main text
SELECT TEXT
DELETE TEXT

PROCmaketext

SELECT TEXT
CURSOR TOP
DISPLAY
SAVE TEXT "fontdis"

REM Return to WW+ Edit mode.
*FX138,0,27
END

.maketext
 REPEAT
  PROCgetname
  IF Z$="" THEN GOTO endmake
  SELECT TEXT
  TYPE A$+Z$+B$
  TYPE J$+Z$+M$+N$+X$+K$+M$+N$+X$
  DISPLAY
 .endmake
 UNTIL Z$=""
ENDPROC

.getname
 SELECT SEGMENT 2
 Z$=GLT$
 ENDPROC
```

Product: Midnight Tracer
Price: £52.13 (inc. VAT)
Supplier: Midnight Graphics, 5 Victoria Lane, Whitefield, Manchester M25 6AL.
Tel: 061 766 8423

Drawing the line

Steve Turnbull checks out a new package that turns pictures into drawings

THE biggest problem in DTP is reproducing low resolution sprites without the jaggies – the jagged lines produced by the pixel size. The solution is to produce draw file images, but this involves great skill and patience, either drawing from fresh or manually tracing the sprite in !Draw.

The solution is a software tracer that takes the sprite and draws around the colour borders, producing a draw file of the result. The advantage of draw files is that they can be re-sized and distorted without any loss of accuracy, and the curves stay smooth whatever size you use.

The Midnight Tracer is the first such software to appear in the Archimedes market. The nicely boxed package consists of a disc of the !Tracer software and a short but helpful manual.

Double-clicking the !Tracer icon results in a copyright window popping up while the main program loads. It disappears when you load a sprite to be traced – or you can simply close it.

The software is very simple to use: First choose your sprite and drag it on to the Tracer icon, the sprite is loaded then a Mode 12 copy of it is created.

You then have a choice: If it's a simple monochrome sprite you just click the sprite window to start the tracing process, but if you need to get clever you can alter the sprite and tracing dialogue boxes.

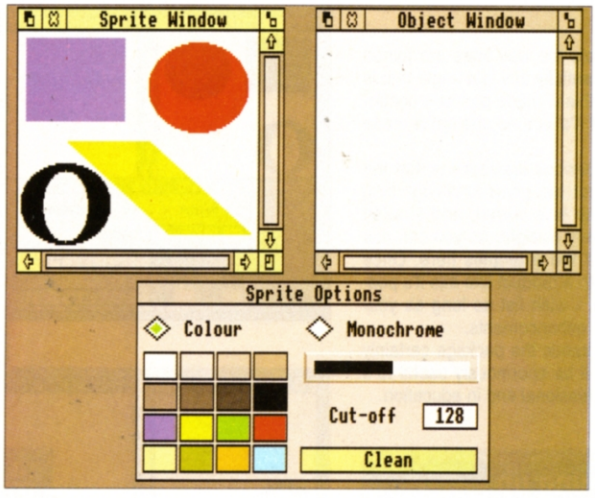
The sprite options for monochrome allow you to specify a threshold level where greys become black or white, while for colour you can mask out some colours completely. Unfortunately you can't combine both facilities, which would have been enormously useful.

With the monochrome thresholding comes the Clean button, which wipes out individual pixels. It will knock out black ones in a white area and vice versa. This clean up makes the tracing process much easier.

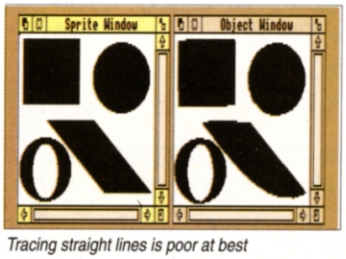
The tracing options are more extensive, with four parameters to play with. Sample allows you to modify the number of pixels of the image that are examined before !Tracer acknowledges a change of colour, this will tend to flatten out a curve containing a lot of *wiggles*.

The next choice – Close – affects the minimum distance between control points for curves. Clearly the larger this value is, the fewer the control points and the smoother the curve. But details are again missed – not necessarily a bad thing.

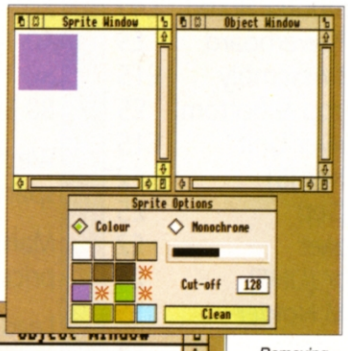
Smooth is specified as an angle up to



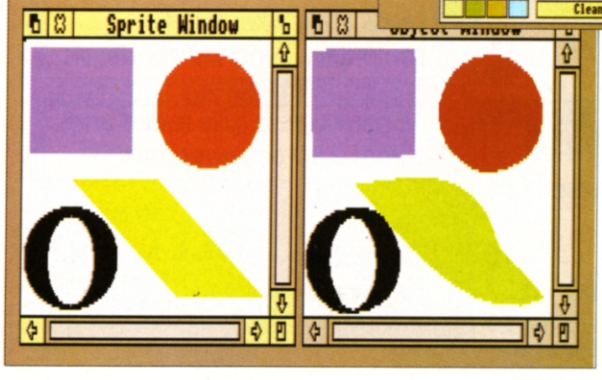
The sprite options window



Tracing straight lines is poor at best



Removing unwanted colours



Auto-trace works from the outside inwards

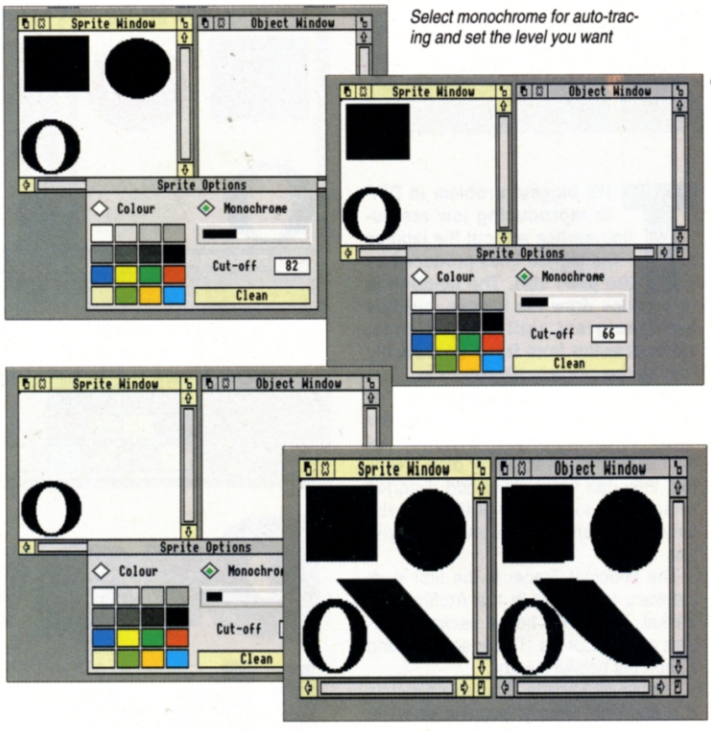
90° and affects the way lines are joined together. Essentially any join angle that is greater than this is made part of a continuous curve, if it's less no attempt is made to smooth it.

The most serious drawback is that the program is not too good at recognising when a corner is a corner, and straight lines aren't very straight, as you can see from some of the examples here. Once presented with a product like this it's possible to start a wish list as long as your arm of clever enhancements.

But, as it stands the package certainly works and will be enormously useful to s hobbyist, professional and in education.

Summing up

!Tracer is the first of its kind on the Archimedes, which makes it first in a field of one. Professional users can undoutedly produce a wish list as long as their arm of things they'd like it to do. But as a basic tracing program it's very effective for most purposes as it stands.



Select monochrome for auto-tracing and set the level you want

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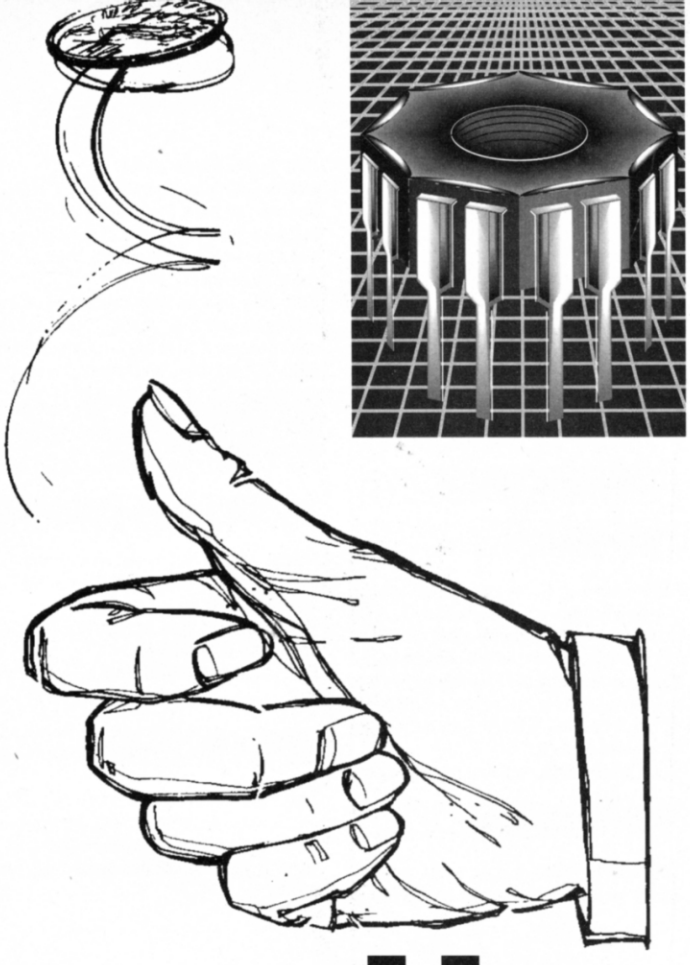


Heads you win!

Paul Mason has come up with a brilliant utility to take the toil and tedium out of creating module headers

EVEN experienced Archimedes and BBC A3000 programmers can find creating headers for relocatable modules tiresome, and beginners can be put off by the masses of code needed to go into creating, say, a single SWI – software interrupt.

But this Basic program – ModuleHead – takes the chore out of writing modules. It creates the header, including the code to handle SWI errors and even puts together the command and SWI information blocks, leaving only the code itself to you.

Even a relative novice in ARM code can be producing their own commands and SWIs in a matter of hours. The program itself is quite long so you'll find it on the subscription disc.

If, like most people, you prefer trying to use a program without reading the documentation, you're welcome to have a go. However, it's advisable to read the following section before launching yourself straight in. But feel free to experiment as you read.

Once you've created your module header you need to add the dedicated code, so the saved file needs to be transferred to Basic. All you have to do is press f12 and type:

```
Basic -load<program name>
```

and the program will be loaded, tokenised and numbered. The first line is *[OPT pass%* and to allow it to run you must include the lines:

```
FOR pass%=4 TO 6 (or 7) STEP2 (or 3)
P%=0:O%=<code start address>
```

at the beginning, and *]:NEXT* at the end. The reason that they were not included was because of personal preference – some like to use *code%* as the store while others go for *mcode%* and so on.

● *So there you have it. Exit the tedium of creating module headers, leaving you to get on with the complicatedbits.*

➤

What's what on main menu

New Module: Should be used with caution, as it destroys all current work not saved. You can use it to restart after working on one module to ensure there's no spurious data hanging around from the previous task.

Save Module: Saves the current module header to disc – with the file type &FFD, Data. As always, work should be saved frequently, in case of a power cut, inquisitive cats or similar disasters.

Name Module: All modules must have a title, the default one is *TestMod* and this facility alters this title. The title is also used as the SWI prefix, so the default would be TestMod_*swi name*.

Commands: Many modules support star commands and this gives access to the submenu relating to these: Create command, Edit command and Exit which we'll take a look at later.

SWIs: Software Interrupts – SYS commands in Basic – are fundamental to the concept of the entire operating system and are the means by which different modules communicate. This option gives access to the SWI submenu: Create SWI, Define chunk number, Edit SWI and Exit.

Code: Every module should have a number of standard pieces of code and this option leads to the Code submenu so you can more easily define them: Start code, Initialisation code, Finalisation code, Service code and Exit.

Commands sub-menu

Create command: This utility allows up to 64 commands and this option allows you to enter the name of the command.

Edit command: Another sub-menu is presented with the following options: Name, Rename, Help, Syntax, Code, Max params, Min params, GS map, Flags and Exit. The options cannot be used if no commands have been defined.

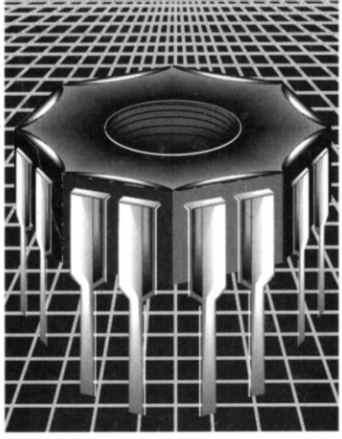
Exit: Quit the menu and return to the root.

The starting points for the code for each of your commands must be labelled: command0, command1 ... *and so on.*

Edit Command sub-menu

Name: Allows you to define the name of the command to be edited. The default is the last one used.
Rename Using this option, you can rename a previously defined command.
Help, Syntax: Enables you to enter the help and syntax strings. The defaults are no help, and the default syntax message. These strings must not exceed 255 characters in length.
Code: Not all commands are actually star commands. Some, like *PowerOn* and *Reset* have only help text associated with them. If this option is not selected the command has help text only.
Max and Min params: The operating system can perform pre-processing of star commands before they actually reach your module. With these options you can specify the maximum and minimum number of parameters permitted. If the number of parameters supplied is incorrect an error message will be generated and your routine will never see the command at all.
GS map: The GSTrans – General String Translation – map for the first eight parameters can be altered by this command. This map alters the way in which the parameters are passed to the module.

This option allows automatic scanning of command parameters and arranges them for the actual command code to process. If the parameters supplied don't match the map the syntax message for this command is issued.
Flags: Yet another sub-menu with the options: File command, Configure command, and Exit.



Command Flags sub-menu

File command: Some commands should only be available when the module is a filing system and is currently selected. If this flag is set, the command will become such.
Configure command: This flag allows the command to be recognised as a parameter to *Configure and *Status. They will not be recognised on their own.
Exit: Quit the menu and return to the root.

SWI sub-menu

Create SWI: With this option you can create the necessary header information for a SWI. Again, 64 is the limit.
Define chunk number: The chunk number defines the base for all SWI numbers in that module. If you intend to write commercial software, You will need a number allocated by Acorn.
Edit SWI: This leads to a submenu: Name, Rename, and Exit. Again, these options can't be used if there are no SWIs defined.
Exit: Quit the menu and return to the root.

The starting points for the code for each of your SWIs must be labelled: swi0, swi1 *... and so on.*

Edit SWI sub-menu

Name: Allows you to define the name of the SWI to be edited. The default is the last one used.
Rename: Use this option to rename a previously defined SWI.
Exit: Quit the menu and return to the root.

Code sub-menu

The options available here are *Start*, *Initialisation*, *Finalisation* and *Service code* they are simple on/off switches that specify whether your module has these code entry points.

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Diary of a game

January...

The month kicked off on the graphic designer with some girders. The idea is that they will form part of the building materials lying around the universe and generally get in your way.

Some rocks will be protected by girders, which means you can force your way in and out to get the rocks if you so desire but your shield would be seriously deteriorated.

The girders can only be removed be shooting the control towers which provide the energy field that holds everything in place. This shouldn't be necessary in the first couple of levels, but as you progress you will need to collect more fuel from the rocks.

Altered the radar routine a little to make it wrap around. This is a common feature of radar-driven games, as it allows the player to move around freely withoutfear of flying off the map.

Left the program running for a little while, only to find that the radar had gone slightly out of sync with the play area and the transporter was about six ship lengths from where it should be.

A quick alteration, followed by two hours continuous running, was enough to convince me that the game was so far bug-free (I hope).

Installed a crude firing mechanism in the form of a bullet – it worked OK but looked pretty pathetic. It's just not quick enough. Replaced this rather dated cannon with a top-of-the-range laser weapon.

It looked so much better and the addition of a disintegration routine finished it off quite well. I suppose a laser would appear and then disappear instantaneously, but a bit of graphic licence doesn't hurt.

Disaster

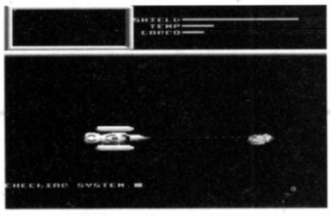
It's always the way! Everything seems to be running smoothly when, out of the blue comes a big problem: Superior want their Beeb back. Fair enough, as they have kindly let me make use of it for some time now. Looks like I'll have to find another. Any offers?

Managed to get hold of a machine from a friend's place of work (thanks Paul!). I lost about a week there, but it gave me time to think up a suitable name for the game. The first ideas were names like *Lifeblood* and *Time Lapse*, both extremely catchy and appropriate. After a lot of thought, however, it was finally decided to call it ***Paradox***. After all, going back in time to the place which will eventually become your birthplace is a bit of a paradox.

Settled into the game again after the interruption and found that I could take a much more critical look at it having been away from it for a short while.

The main problem I found was the keyboard response: Before, you could hold down the appropriate direction key and you would accelerate in that direction.

Lovely! The trouble was that it was almost impossible to home-in on the rocks as the keys were too sensitive, making it rather hard to stop. A slight alteration cured this. You can still accelerate away in any direction as before, but now you can also make fine adjustments to your position when you're not moving by lightly tapping the key to nudge the



craft in that direction. It makes a world of difference and should enable the player to concentrate on the gameplay rather than trying to keep control of the craft. A very valuable addition indeed.

Having improved the control mode, it was time to install the collision detection on the laser. It wasn't too difficult mind, as it's a very simple set of rules for the Beeb to follow: Anything in front of the ship will get hit. If it is a rock it's temperature will increase, otherwise nothing will happen and the beam will disintegrate.

I haven't come up with any suitable sound effects yet, but that's something to be done when everything else is up and running.

The next logical step seemed to be installing the bar graph for the rock temperature. This didn't take long as I sneakily used part of the routine which is responsible for handling the shield graph (snigger snigger).

There was a short pause as I tried to decide exactly when the temperature was to be displayed. After all, I couldn't have 15 or so bar graphs at the top of the screen for obvious reasons.

The answer, as always, was the logical approach – to display the temperature of the current rock shown on screen. The problem was that only one rock temperature could be displayed at any one time.

Hm! I'll just have to make sure that the event of two rocks appearing on-screen at the same time will never occur.

After a bit of tinkering the bar graph was in full operation. It even displayed zero temperature when no rocks were present. Extremely logical, Captain.

Went back to the firing routine and tied it in with the ship's collision detection. Now I have a laser which heats up the rock, and when the rock temperature is above a certain level the player can ram the rock and collect all of the Arionite from it. Good eh? Once this has been done, the rock is now redundant, and cannot be heated up again.

Nipped over to the sprite (screen!) designer and came up with a rock which has a distinct empty and redundant look about it. Changed the collision routine a little more to incorporate this new sprite.

Now when the rock is rammed the sprite pointer is relocated and the redundant rock is displayed. The player can now see at a glance whether the rock is dead or not.

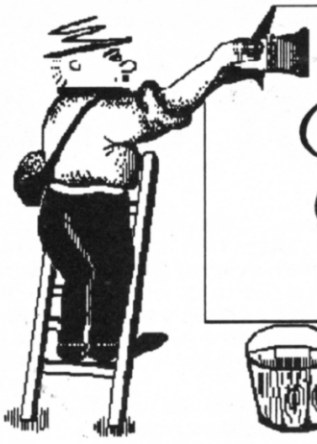
As I appeared to be on a lucky streak and – thoroughly snowed in – I immediately set about installing the cargo bar graph. This will display the amount of Arionite held by the player and basically say when enough has been collected.

Again I was able to use the routine that drives the other bar graphs,so keeping the length of the program down to a minimum. One nice touch gained from the routine is that each rock can hold a different amount of Arionite, making the gameplay that little bit tougher.

The rock routine appears to be complete, which leaves me to get on with the inhabitants of the universe. I appear to be rapidly running out of time though, so I'll start that next month.

Found time to squeeze in a bit more programming for the menu, and have now completed the main tune. I have the music ready for the hi-score table, which I will incorporate at a later date.

● *Will he have room for the hi-score tune? When will Paul want his Beeb back? When on earth is he going to get a proper sprite designer? Find out next month!*



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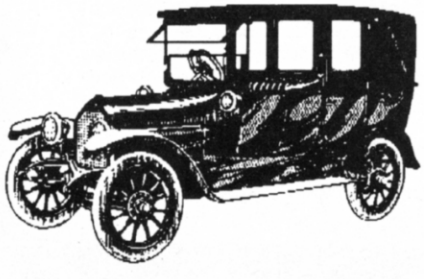

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ROUTINE MATTERS

Game for a high score?

Author: Pete Goodliffe
Language: Basic
Filename: HofFame

AFTER creating your latest game masterpiece, what is needed to add that final touch of magic? A hall of fame may well be the answer. But how can one be written to appear attractive, yet take up little of the remaining memory?

The routine below is a fully-fledged high score table which can cater for any number of entries – the default is 10. Each entry requires up to 24 bytes in which both the score and a player identity string of up to 20 characters are stored.

Mode 7 is used for the display as it only requires 1k of memory as storage, yet provides plenty of colour and a double-height facility. The routine is simply a skeleton for your needs. It provides the basics and is quite adequate in itself, but is also capable of being easily customised to meet your requirements.

```
  10 REM Hall of Fame
  20 REM by Pete Goodliffe
  30 REM (c) The Micro User
  40 MODE 7:VDU 23,1,0;0;0;0;
  50 DIM NAME$(9):DIM SCORE(10):RESTORE
:FOR N=0 TO 9:READ NAME$(N):SCORE(N+1)=(
10-N)*10:NEXT:PROCdisplay:END
  60 DEF PROChall(SCORE):IF SCORE<SCORE
(10) PROCdisplay:ENDPROC
  70 M=10:REPEAT M=M-1:UNTIL SCORE<SCOR
E(M+1) OR M=-1:FOR N=9 TO M+2 STEP-1:NAM
E$(N)=NAME$(N-1):SCORE(N+1)=SCORE(N):NEX
T:NAME$(M+1)=FNinput:SCORE(M+2)=SCORE:PR
OCdisplay:ENDPROC
  80 DEF FNinput:CLS:PRINT'''''CHR$131"
CONGRATULATIONS!"'''CHR$132"Your score is
 in the top 10"''CHR$129"Please enter yo
ur name..."''CHR$133"   >";:INPUT "" A$:
IF LEN(A$)>20 THEN A$=LEFT$(A$,20):=A$ E
LSE =A$
  90 DEF PROCdisplay:CLS:FOR N=0 TO 9:P
RINT TAB(13,0)CHR$141CHR$130"HALL OF FAM
E"TAB(13,1)CHR$141CHR$130"HALL OF FAME"T
AB(6,3+N)CHR$132;N+1")"TAB(10,3+N)CHR$13
1;NAME$(N)STRING$(20-LEN NAME$(N),".")TA
B(31,3+N)CHR$129;SCORE(N+1)
 100 NEXT:ENDPROC
 110 DATA ...Pete Goodliffe,...,.....p
resents,...,.....a simple,...,....Hall
of Fame,...,.....routine,...
```

IF you have written a routine that may be of interest to other readers, and suitable for publication in this column, do not hesitate to send it in on tape or disc along with documentation to:

Stephen Wade, Routine Matters, The Micro User, Europa House, Adlington Park, Macclesfield SK10 4NP

Don't forget to tell us your telephone number, and enclose a stamped addressed envelope to guarantee the return of your media. Also provide us with a declaration stating that the routine is all your own work, has not been submitted elsewhere, and that we have your permission to use it.

Taking command

Author: Richard Hindle
Language: 6502 code
Filename: QCsrce

A USEFUL facility which is available as standard on the Electron, but not on the BBC Micro, is that which allows you to enter selected Basic commands by pressing a couple of keys simultaneously.

To bring such a facility to the BBC Micro is not as difficult as may at first seem. Using the keyboard event, *evntv*, it is possible to detect and intercept all input operations from the keyboard.

This is the principle behind the program below. It uses the event to check for key combinations entered with Shift and Ctrl held down at the same time.

Once one is detected the Ascii code of the third key is checked against those stored in the table which begins in line 160 to determine whether any action is necessary.

The keys intercepted by the program, and the commands they perform, are as follows:

Key sequence Ctrl+Shift+...	Command performed
R	RUN
O	OLD
L	LIST
N	RENUMBER
#	CLOSE #0
>	*CAT
C	CHAIN"
M	MODE
S	SAVE"
P	PRINT"
V	VDU
*	*LOAD
G	GOTO

The program also generates a machine code file by the name of *QC* in the current directory which can be called on subsequent occasions using **QC* to load the code directly into memory.

Break is intercepted directly to allow the code to remain permanently resident in your micro until it is switched off. However, should you wish to disable it, simply press Ctrl+Shift along with function key nine.

```
  10 REM Quick Commands
  20 REM by Richard Hindle
  30 REM (c) The Micro User
  40 FOR pass=0 TO 2 STEP 2:P%=&900
  50 [OPT pass:.install
  60 LDA &220:CMP #start MOD 256:BNE ok
install:LDA &221:CMP #start DIV 256:BNE
okinstall:BRK:BRK:OPT FNequs("QC is alre
ady installed"):BRK
  70 .okinstall LDA &220:STA ovec:LDA &
221:STA ovec+1:LDA #247:LDX #&4C:LDY #0:
JSR &FFF4:LDA #248:LDX #break MOD 256:LD
Y #0:JSR &FFF4
  80 LDA #249:LDX #break DIV 256:LDY #0
:JSR &FFF4:LDA #start MOD 256:STA &220:L
DA #start DIV 256:STA &221:LDA #14:LDX #
2:JSR &FFF4:LDA #7:JSR &FFEE:RTS
 100 .break BCS okinstall:RTS:.start PH
P:CMP #2:BEQ yeskey:PLP:JMP (ovec)
 110 .yeskey PLP:TYA:ORA #&80:STA key:T
XA:PHA:LDA #202:LDX #0:LDY #&FF:JSR &FFF
4:TXA:AND #&48:CMP #&48:BEQ go:PLA:TAX:J
MP fin:.go PLA:LDA key:LDX #&FF
 120 .loop INX:CPX #(endtable-table):BE
Q fin:LDA table,X:BPL loop
 130 .keynum CMP key:BNE loop:CMP #185:
BEQ unlink:.comloop INX:LDA table,X:BMI
fin:TAY:TXA:PHA:LDA #138:LDX #0:JSR &FFF
4:PLA:TAX:JMP comloop
 140 .unlink LDA #247:LDX #0:LDY #0:JSR
 &FFF4:LDA ovec:STA &220:LDA ovec+1:STA
&221:LDA #13:LDX #2:JSR &FFF4
 150 LDA #138:LDX #0:LDY #13:JSR &FFF4:
LDA #7:JSR &FFEE:.fin RTS
 160 .table OPT FNequb(185)
 170 OPT FNkey("R"):OPT FNequs("RUN"):O
PT FNequb(13):OPT FNkey("O"):OPT FNequs(
"OLD"):OPT FNequb(13)
 180 OPT FNkey("L"):OPT FNequs("LIST"):
OPT FNequb(13):OPT FNkey("N"):OPT FNequs
("RENUMBER"):OPT FNequb(13)
 190 OPT FNkey("#"):OPT FNequs("CLOSE#0
"):OPT FNequb(13):OPT FNkey(">"):OPT FNe
qus("*CAT"):OPT FNequb(13)
 200 OPT FNkey("C"):OPT FNequs("CHAIN""
"):OPT FNkey("M"):OPT FNequs("MODE")
 210 OPT FNkey("S"):OPT FNequs("SAVE""
"):OPT FNkey("P"):OPT FNequs("PRINT""")
 220 OPT FNkey("V"):OPT FNequs("VDU ")
 230 OPT FNkey("*"):OPT FNequs("*LOAD "
):OPT FNkey("G"):OPT FNequs("GOTO")
 240 .endtable OPT FNequb(&FF)
 250 .key BRK:.ovec BRK:BRK:]:NEXT
 260 *SAVE QC 900 +150
 270 CALL install:END
 280 DEF FNkey(a$):?P%=&80+ASCa$+64*(AS
Ca$>64 AND ASCa$<91):P%=P%+1:=pass
 290 DEF FNequb(n):?P%=n:P%=P%+1:=pass
 300 DEF FNequs(s$):$P%=s$:P%=P%+LEN s$
:=pass
```

POSTER

An object-based DTP package which allows you to do far more than create posters. In fact there isn't much in the way of DTP design and layout that can't be done with Poster. It's almost an art package. The application is fully RISC OS compliant so can 'talk' to Edit, Draw and any other RISC OS program. Poster comes with its own set of unusual outline fonts but will allow you to use any RISC OS outline fonts. It also has a huge collection of interesting borders and clip art. Two features place Poster in a different league from other packages. Firstly, you can do wonderful things with text. It can be made to flow along any path or it can be moulded into virtually any shape (as can outline Draw files). Secondly, the size of your document is not dependent upon the limitations of your printer. Poster will allow a document of any size to be created (although 100 metres square is not very practical). It then prints the document in sections which can be cut and assembled using the trim marks. Poster documents may be used in other DTP packages.

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SNIPPET

A utility which will make you wonder how you ever managed without it. Snippet will allow you to print or save any part of any screen. It will even cope with most programs running under the 65Host BBC Emulator. But Snippet will allow you to do lots more. Sprites may be converted from one mode to another and even 8 bit BBC screens may be easily converted into Archimedes sprites. A vast array of tools allows you to trim sprites, add borders, change colours, use outline fonts to add text, edit pixels, rotate sections and combine any number of sprites to make a single sprite. A carousel allows sprites to be displayed.

ALSO...

JIGSAW — allows sprites of any size to be converted into jigsaws with real jisaw-shaped pieces. It comes complete with a set of pictures including some by the well–known artist Rodney Matthews.

JIGLET — the version for younger users. It has fewer pieces and a more appropriate set of pictures.

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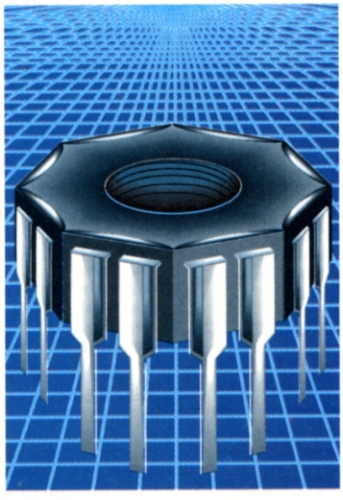
Tel: 0932 240432
Requirements: A3000 and Archimedes range

Terry Blunt looks at a new way to get his micros talking to each other

Chat line for Archie



TRANSFERRING data quickly and reliably between two Archimedes or A3000s can be a problem. The serial port tends to be slow and clumsy while Econet is expensive and can be unnecessarily complex if all you want to do is move a few blocks of data between two machines.

DR Computer Products have provided a simple solution to this problem with The Missing Link. TML is a serial data transfer system consisting of a hardware board for each micro, a two metre connecting cable and the supporting software on disc.

Release versions will also have a printed manual, but this is only in the form of text files on the disc of my review copy.

Installation is very easy, and there are clear step-by-step instructions. DR Computer Products advise a dealer fit, but I think anyone with reasonable dexterity would have no difficulty.

The boards are anonymous two inch squares, totally encased in black epoxy resin. They fit into the sockets where the Econet would normally be, and use the external Econet sockets to communicate with the outside world. No back-plane space is taken up, although this means you can have either the TML board or Econet, not both.

I can't give an actual figure for power consumption, but after running for over an hour the boards were hardly warm, suggesting that very little power was being consumed.

There is a relocatable module on the disc to provide the low level-interface, and an application that provides a multitasking transfer utility. This fits in well with the Filer, but is not quite an extension of it. Files are simply dragged into the open TML window and, if the link is live, they will be transferred across and removed from this window on successful completion. Failure to transfer for any reason results in the files remaining in the TML window.

More development is being carried out on this which should result in network capability and the ability, for example, for an A3000 to access a A420's hard disc as a slave system via the link.

Other software on the disc consists of a couple of test applications and !System with the latest version of the shared C library.

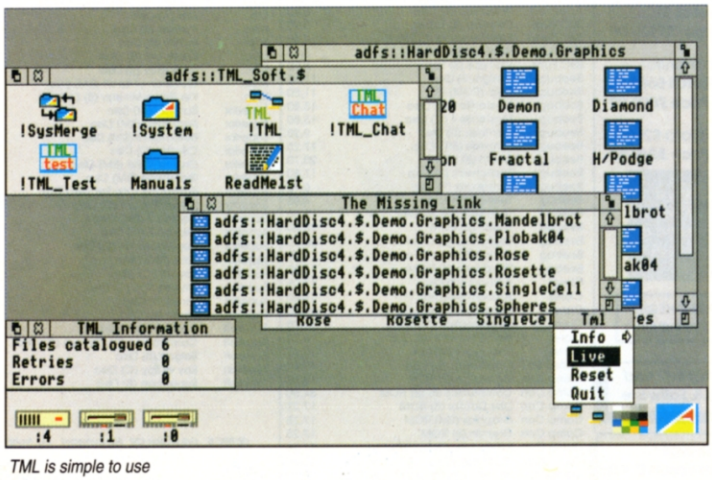
TML boasts a speed of 10 million bits a second, but in practice a somewhat lower transfer rate is realised. The link is not seen as a competitor to Econet, rather a low cost, fast and flexible alternative data transfer system.

At its low level it operates in a similar, but very much faster, manner to the RS432 port, being a duplex link with an acknowledge handshake.

There is a single SWI with seven different functions, determined by the value in R0. The first three are simple reset, hardware check and timeout operations.

However, the really interesting operations are those for reading and writing bytes, and reading and writing data blocks. These are exceptionally easy to use – so much so that it took me only 10 minutes to write a short Basic program to transfer a 250k block of memory between two machines, which it did in only 304 centi-seconds.

The only time the system really complained was when I deliberately tried to transfer files to a corrupted disc. The link disconnected itself at one end and I had a bit of trouble getting both ends talking to each other again.



TML is simple to use

The bottom line

This is a useful, inexpensive data transfer system. It should be particularly interesting to people wanting to experiment with their own protocols and error correction ideas.

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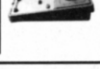

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Bucking the odds

Graham Kendall hasn't got a foolproof system to beat the bookies. But he can tell you the best way to program one that will!

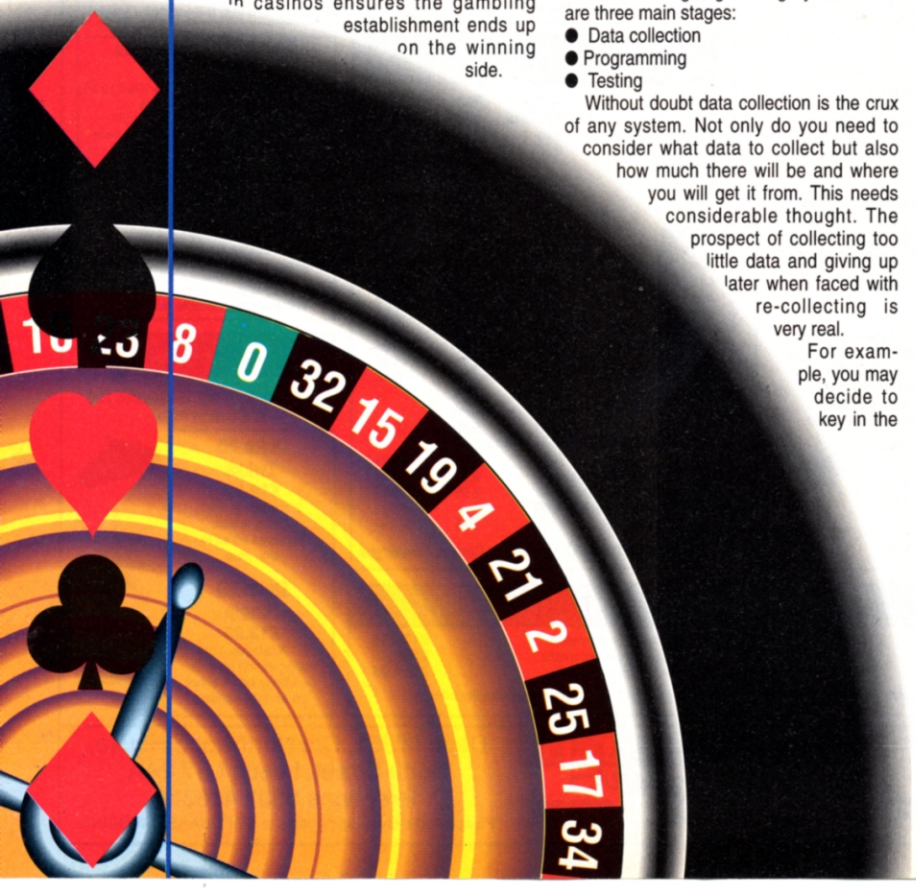
YOU would think that computers are the ideal tools for waging war against the bookmakers. Lots of data to analyse, maths to play around with and, if we're successful, something more satisfying than zapping a few aliens.

And they are ideal – but there's just one flaw: The bookmaker will always win. No matter what we do, short of holding a gun to his head, our money is on a one way trip into his pocket.

The mathematics of gambling are such that, over a period the bookmaker will take a certain percentage of all money bet.

With the foootball pools it is easy to see how this is achieved: When all the money has been collected they strip off their percentage and what's left is paid out to the lucky people who manage to get 24 points.

With something like horse or dog racing the way the percentage works is not as obvious but it's still there. The same goes for roulette the *house edge* as it is called in casinos ensures the gambling establishment ends up on the winning side.



A waste of time?

Can we beat the bookie? I think we can – but there's no secret formula and please re-read that first section again so that you realise what you're up against.

Let's take a look at the stages we need to go through to develop a gambling system . We're not going to use any actual methods here, just some ideas plus a list of suggested reading if you want to have a go.

When writing a gambling system there are three main stages:

- Data collection
- Programming
- Testing

Without doubt data collection is the crux of any system. Not only do you need to consider what data to collect but also how much there will be and where you will get it from. This needs considerable thought. The prospect of collecting too little data and giving up later when faced with re-collecting is very real.

For example, you may decide to key in the result of every horse race. But do you just include the horse and jockey that came first, second and third? Or do you include every horse, rider, stable, owner, trainer, the course, the going, day of the week and time it started? The answer lies with you and your system.

The quantity of data is a major factor, and if you're planning on keying in all that information you can say goodbye to your social life. Even football results are a daunting task, and although the information peaks on a Saturday there's still some work during the week.

With such quantities of data you're going to need somewhere to store it. Horse racing detail will occupy dozens of floppy discs and even hard disc owners will find free space eroded very rapidly.

Before keying the data in you must also consider how you will access it. If the records are indexed by the horse's name what will you do when you want to access the database by jockey name, or course? A serial search may take an unacceptable amount of time.

The source of the data is easier to consider. For horse racing there's The Sporting Life or The Racing Post. Any daily paper gives the football results. You should make sure it provides *all* the information: What, for example, do you do if the Vauxhall Conference League comes up, as it often does? If you've not been collecting data on it you'll have to resort to sticking pins in again.

You could try to do away with data collection altogether. With this method you just put in the relevant information at runtime and hope for the best. The trouble with historical data is that after entering it all, it may never be used.

Data collection is the usual reason people give up their gambling system. Enormous initial enthusiasm tends to wane after spending yet another Sunday keying in the previous day's results.

Once you've built your database you can write your program. Well to be honest you can start with this section, then do the data collection – it's your choice.

But bear in mind that if you write the program first you'll only collect data relevant to that version. As your program develops – and it will – you'll have to keep going back and adding more, which is worse than doing it right the first time.

One way round this catch-22 situation is to build a database that is designed to include every relevant piece of information, but just key in a little bit so the program can run as you write it. When it comes to the full testing you will have to add all the data you've previously missed.

The system

Writing the program depends heavily on your ideas. But whatever you do, ensure you write it in short procedures with clearly-defined interfaces to make changes easier and keep the standard routines the same in each version you write.

The idea is that your selection formula – the bit that does the work – is a separate procedure to everything else, then you can just plug in different selection routines without having to re-write the supporting code each time.

What actually goes into the selection routine is the biggest problem, and anyone who knew what to program wouldn't be writing an article on general principles, they'd be counting money as it came in.

Over the years there have been many articles that listed programs which aided the fortune-making process. As far as I know they never made anyone rich, but they might spark off an idea that could be the start of the ultimate gambling program.

There are also a lot of books on the subject, some listed in the panel. You can get them from libraries but they're not too expensive.

No book or magazine article will ever give you a winning method, what you are looking for is inspiration – the slightest chink in the bookies' armour that will allow you to make money.

So, the program's written and you are ready to dry run it. No matter how many times and on how much data you have run the program, it must still be tested in the real world. That means getting out of the bedroom and into the betting office or casino to see how the program works in practise.

The idea is to find out if your brainchild is practical. It may work fine in your nice warm bedroom but out on the dog track you may hit snags – not enough time to bet, the bookie won't take the bet you want to place, the winnings are not being paid out as quickly as you expect.

On the pools you might have been including Friday night matches, but if you have to post the coupon on Thursday that won't work – and it might mean the difference between winning and losing.

So always carry out dry runs, test out the system as if you were really using it – but use reduced stakes or, if possible, don't part with any money at all.

Once the dry run is complete analyse the results, bearing in mind the most important question: Have you shown a profit?

That's not all there is to it. You must also use a couple of control tests, one of these is picking horses or whatever at random and the other is to follow the tipsters.

If either of these is ahead of your system, you must ask yourself whether what you've got is really any good – especially if the random test is better.

● *If, by the end of all this, you end up with a system that makes money just package it up in a plain brown envelope and send it to me. I will then demonstrate how the final part of the project should be carried out.*

Book	Author	Publisher	ISBN
Guide to Winning the Pools	Dennis Jones	Rosters	0948032499
Betting for Profit	David Duncan	Foulsha	0572015402
Betting for Fun and Profit	Tony Hill	Hartley Publications	0950826650
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● BBC B issue7 8271 DFS 225, Cub monitor 215, 5 1/4/ 3 1/2" 40/80T D/D 150, Co-Pro Adaptor + 80/86 + mouse 110, Morley teletext adaptor 55, Solidisk 256K sideway RAM + software 65, Watford 1772 DFS 32, Acorn ADFS 14, ZIF socket 10, Inter-Word 22, Inter-Sheet 24, Disc Doctor 14, Beebugs 'C' 45, Solidisk rtc 10, Light Pen (no software) 8, Advanced user guide 8, 3 1/2 years back issues Micro User, A+B computing 30 or 850 ono the lot- Phone 0274 600652.

● Phillips Green Screen monitor unused 45. 021-351-1389 Birmingham.

● BBC B DFS, 40/80 disk drive, wordwise + Joysticks, Manuals 190 0925 604195.

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● Master 128K with manuals, welcome diskette only 300. Epson FX800 with cut-sheet feeder 250. Phone 0708741157 after 7pm.

● BBC-B+ 64K, 1770 DFS view Rom (20K ram available in mode 0) when shadow ram used 175, 6502 Acorn second processor 80. Tel Rugby 0788 815278.

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FIRST there was SimCity, in which you tried to keep a city running and expanding. Now you have the opportunity to do the same for an entire world.

Actually, as worlds go it's not that big, but certainly enough to keep you busy. You start off with a virgin world of deserts, mountains, oceans, forests and grasslands and have to start up your civilisation without upsetting the balance of nature.

Some areas like grassland are available for building on, but others aren't – forests, seas, deserts and mountains. Now forests can be converted to grassland, but if you tear down the trees to make way for people you'll destroy the balance and there goes the ball game.

Cities need power and you can choose between coal, oil and nuclear power stations and a survey will tell you what types of resources are available in the area.

You also need the support structure of mines, oil rigs and refineries, plus some way of disposing of spent fuel. People also need fresh water and a sewage system so you have to build the appropriate systems.

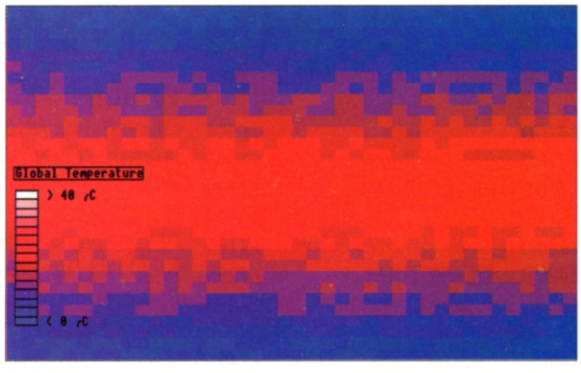
You can bypass waste disposal of all types but dumping nuclear fuel or coal slag on the surface and outputting untreated sewage into the sea eventually has unpleasant effects on the environment. Sounds quite familiar, doesn't it?

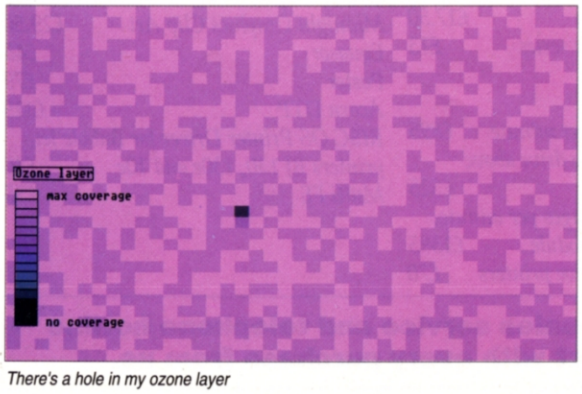
You can build cities at a rapid rate, and the program assumes that people suddenly appear to populate areas you develop. Alternatively you can simply allow the cities to grow naturally while you deal with other areas.

Unrestricted growth is itself a bad thing as there is a limit to how many city areas your various amenities – power, water, sewage – can service, and you'll soon be getting messages about power cuts.

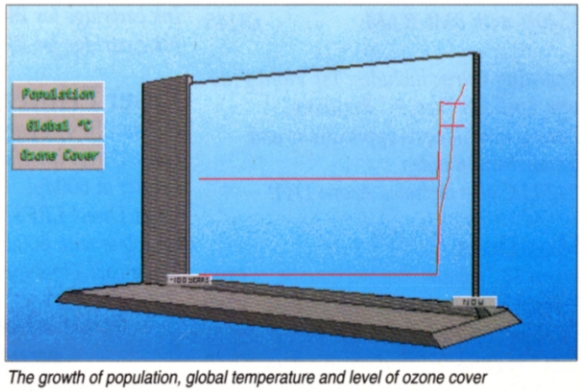
This excess growth is easily handled by placing barriers in the way – trees are a good option, pipes are another. Time itself proceeds at a rate of one month per 10 seconds.

I don't know whether it's a bug





There's a hole in my ozone layer



The growth of population, global temperature and level of ozone cover

or a feature, but by judicious developing with oil rigs and clearing you can convert sea areas to land and then build on them, though this is a very expensive way of creating more building land.

Any modification of the environment costs power, which is the single factor controlling what you do. Every action expends a certain amount of power and you should take care not to run out. Should you do so you simply become a spectator until the power builds up again.

Gameplay is similar to SimCity in that you have a window on the world and can select what you want to do from icons. The whole thing is mouse controlled. You can get displays of population growth, global temperature, ozone layer density and a mineral survey of the current area.

One clearly deliberate factor is that there is no indication anywhere of how much actions cost. This is a good point, but I would really like to know where my power comes from, as this is the greatest drawback in play: Without knowing what restores power there's no basis for decision making.

If power comes from cities you could choose how to develop them, and if it comes from the number of trees you could take the appropiate action.

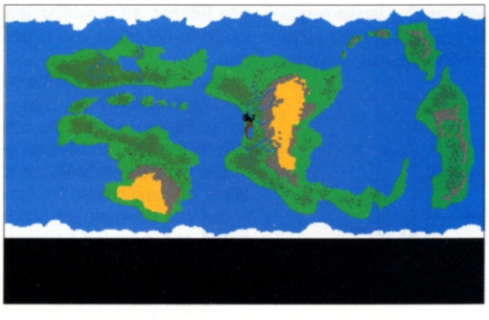
File handling could be improved too, because as it stands you can only load and save to the ADFS. If you have any other filing system there's no way to switch to it. The manual describes how to put the game on to hard disc, unfortunately I couldn't persuade it to recognise the data files unless they were on ADFS floppy.

While WorldScape is interesting to play and certainly has educational value, the lack of coherence makes it just interesting instead of fun.

Geoff Brown

Graphics	*8*
Sound	*N/A*
Playability	*5*
Value for money	*7*
Overall	*7*

Surveying for raw materials



The world map

Natural barriers help to prevent expansion

TAIPEI 2

... interesting characters

Price: £9.95 (mail order only)
Supplier: Black Sheep Software, P.O. Box 1831, London, N15 3NE

IN the April issue we took a look at Mah Jong Patience by CIS, well now it has a rival – Taipei 2. The first version was, and remains, a PD program, but this one is definitely commercial.

The program is loaded by double-clicking from the DeskTop but isn't multitasking. You are presented with the 144 Mah Jong tiles which you have to remove by matching pairs at the end of rows.

This version has a fairly rapid response and uses screen switching to prevent flicker as it redraws the display. Strangely, replacing pieces takes a lot longer than removing them, although this was also true of the CIS version.

In default mode the tiles have their ordinal numbers at the top, or a three-letter description in the case of the flowers. As a result the graphics themselves are a bit squashed. However you can opt for Classic mode which contains the Chinese designs only. I much preferred it.

The tiles were rather simplistic and it was quite difficult in some cases to tell whether a second or third level tile was actually at the end of a row.

One advantage over Mah Jong patience was the ability to take back every move to the beginning rather than being restricted to only five back spaces. Both games allow you to re-start the same layout from scratch.

Other minor features are a scoring option, a record of successfully completed layouts and the opportunity to have any SoundTracker file as background music. But there's no opportunity to save partially completed games to be completed later.

Each version has its own merits. This one costs less but doesn't multi-task – you pays your price and takes your choice.

Steve Turnbull

On the buses

THE BEEB BODY BUILDING COURSE

All aboard with Mike Cook for stage one of a journey on the I²C bus

THERE was a definite feeling of zeitgeist as I talked to the editor about this month's project. Zeitgeist, as we all know, is that almost subliminal feeling, the picking up of an idea, not just any idea, but an idea who's time has come.

Let me explain: Lurking inside the Archimedes and A3000 computers is an interface bus called the I²C – that's pronounced *Eye squared sea.*

It is very simple and is supported by a number of very powerful peripheral chips. It is also possible to fit this bus to the Model B and Master computers. Hence this series of articles to examine its potential.

Why the zeitgeist? Well a major supplier in the Acorn market, Ian Copestake Software, is also working along similar lines. So while things were still in a fluid state we agreed on common connectors and pin-outs to make our projects compatible.

The I²C bus is basically a serial bus consisting of two wires, one carrying the data and the other the clock. Add to this a five volt supply and an earth wire and you have just four wires which can be used to transfer data to and from a number of complex chips.

The system was designed by the electronic giant Philips and is used by them in a number of radio and TV products to achieve simple computer control, like remote control TV and teletext sets.

So, you might ask, what's it doing inside the latest Acorn computers? Fact is that Acorn use it to talk to the real time clock, calender and parameter ram inside the computer. In fact this is a single chip but it means that all the bus support software has to be available.

The idea is that all devices are connected to the same clock and data lines but each has its own address, so the computer can call upon an individual device to engage in data transfer.

That sounds a bit crude but I assure you it isn't. It is a lot like a network, but instead of having individual computers you have individual chips. Various speed chips are catered for by allowing the sending chip to generate the clock signal or the receiving chip to stretch it.

This means that if you want to add another device you simply chain it on the end of your previous board. Here's where the cooperation with Ian Copestake comes in. By making the boards have the same connectors and pin-outs you can chain his boards on the end of mine and vice versa.

The only problem is getting the signals out of the computer in the first place. Now all Ian's expansions boards have an I²C output, but what if you don't have one? Well, in true Body Build tradition we can cut a few corners and save some money. And I would like to look at three ways in which we can extract the appropriate signal.

It's most convenient if we can bring the I²C bus out to a fixed socket at the back of the computer but there are none spare, are there? However, most home users don't use Econet, so providing the expansion board is not fitted, the Econet socket is free.

Inside the computer this is wired to a single row socket with pin 2 already wired to earth. Figure I shows the connections to SK5 for the A300 and 400 series.

It is mounted vertically, as shown in the upper left hand corner. For the A3000, SK5 is half way down the left hand edge of the board and mounted horizontally. Simply plug a 5 way header pin into this socket and solder wires to it.

We can get at the I²C data and clock from the expansion backplane, pins 19 and 20 on row C. If no backplane is fitted we can plug directly in the socket on the board using a 64 way three row DIN connector type 41612 C.

This only leaves the problem of where to tap the 5 volts. If you have no backplane you can get it from the thick red wire bundled up inside the computer. If you have a backplane then pin 30 on row C of the connector will produce the necessary. Row C is the row where the plugs wires bend over the top of the other row (see Figure II). If

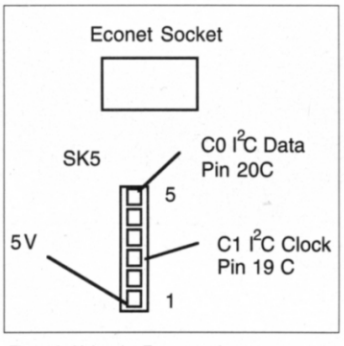


Figure i: Using the Econet socket

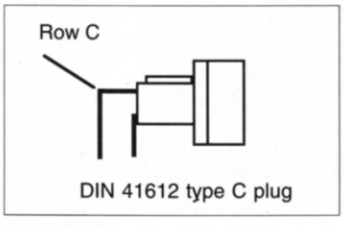


Figure II: The expansion board connector

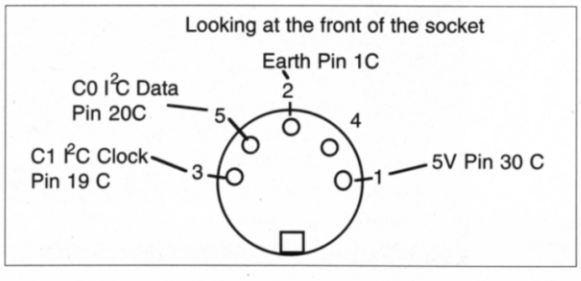


Figure III: Wiring up an extra socket

you look very closely at the plug you will see it marked.

However, if you have an Econet fitted and Acorn's I/O podule without the Midi option, you are left with with two spare holes suitable for fitting a 45 degree 5 pin DIN socket.

Simply cut along the label blanking the holes off with a sharp knife and peel it back. Then fit the socket in the hole and wire it up as shown in Figure III. You can solder the wires directly on to the back of the podules connecting plug.

Finally, if you have both Econet and a full backplane without any spare holes you will have to make do with a flying socket. This is not as satisfactory as the previous two methods as it will permanently dangle out of the back. Make the connections to the back of the backplane, making sure the wiring is neat.

Having got the wires out to a socket we need to be able to make a connection to the I²C boards. This lead is a 5 pin DIN plug to 4 pin Molex socket as shown in Figure IV. The Molex uses crimped connectors on the wires, and I can supply them ready crimped.

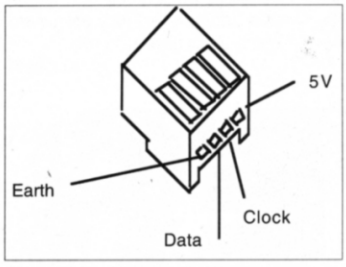


Figure IV: The Molex 5051 socket

● *Now we are all ready to connect up our first board. Next month I will show you how to build a board that contains 8 bits of input / output, four channel 8 bit A/D inputs and an 8 bit D/A output. And all for much less than Acorn's I/O podule.*

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PREVIEW

TOWER OF BABEL

... a long climb

FIRST it was Twin World, then Iron Lord and now Tower of Babel – Cygnus Software Engineering continues its series of successful conversions of games from the Amiga and Atari ST to the Archimedes.

Although still in its early stages graphically – James Byrne of Cygnus intends to convert the 16 colours up to the full 256 of the Archimedes – Tower of Babel is playable, so that's what we did.

The scenario involves the distant past when aliens decided to help some poor earthlings who were trying to build a tower high enough so that they could talk to God. The aliens provided robots – in the form of giant four-legged spiders – to help and teach.

Unfortunately, after some interesting historical events, the humans turned against the robots and began setting traps for them and generally causing mayhem. Now you must help the robots through the tower and ultimately to get back to their home.

The game is best described as a 3D graphic puzzle maze. No luck is involved, you just have to find the way through each level collecting *Klondikes* – energy modules – and zapping a specific number of other objects. There may also be a time limit.

There are three types of robot. Zappers can destroy zappable objects, Pushers can move pushable objects and Grabbers collect the klondikes and can operate other items.

The robots can be operated individually using simple controls but they can also be programmed with up to eight instructions which can be initiated one at a time or all together.

Opposing you are a wide selection of weird and wonderful things: Fixed zappers and pushers, rotating zappers and pushers, worms, watchers, hoppers, lizards, mines, time bombs, blocks, glass blocks and prisms – the list goes on.

Each level is composed of nine stages and you have to perform a specific task for each stage before moving up to the next level. The sheer numbers of different objects – all having different abilities and actions – can bewilder a beginner.

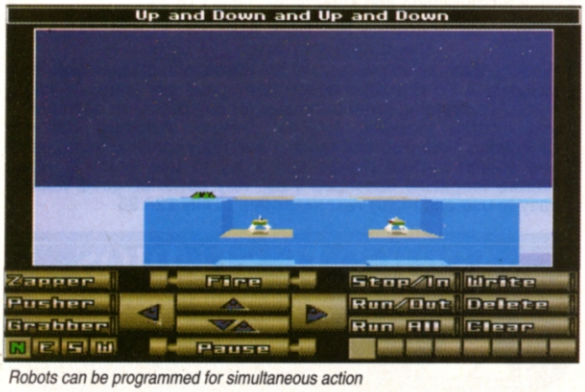
However, a block of nine tutorial stages – along with a section of the 44 page manual – takes you through all the fundamentals.

The software also incorporates a complete tower designer which is very easy to use, although designing a good set of stages would certainly require some skill.

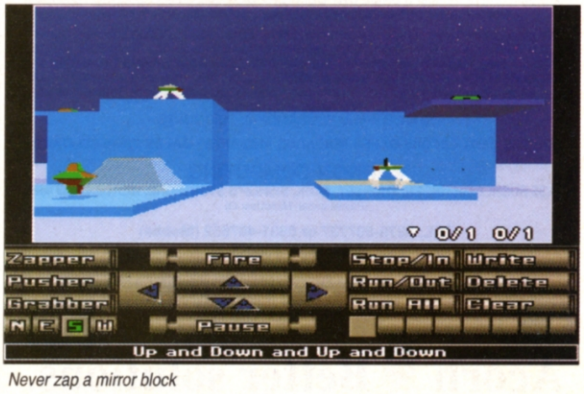
Despite the fact it's incomplete at this stage I found Tower of Babel most addictive and very enjoyable. Watch out for its release.

Lazarus

Every puzzle is fascinating



Robots can be programmed for simultaneous action



Never zap a mirror block

Copper bottomed certainty

Terry Blunt goes back to school with a modular printed circuit designer

Product: QuickTrack
Price: £25.00
Supplier: NCET, Sir William Lyons Road, Science park, Coventry CV4 7EZ.
Tel: 0203 416334
Requirements: BBC Master

QUICKTRACK is a CAD package intended to encourage young people to take a systems approach to circuit design. Working from an extensive library of standard sub-systems, many simple digital control projects can be rapidly built up producing real designs using state of the art electronic components.

The package consists of a heavy duty plastic folder with the software on an ADFS format disc. There are also about 20 data sheets with four items per sheet, and a fairly weighty A4 manual which contains an interesting summary of QuickTrack's history, and the involvement of various bodies, principally LEAs.

The manual has detailed lists of requirements for all stages of development, including tools, materials and components, along with some source information.

Most of the tools required should be available in a reasonably equipped science department and component choices have been made to stretch over the smallest practical range of devices.

QuickTrack is written specifically for the BBC Master. It makes use of both the sideways ram banks and of Viewsheet, the Master's built-in spreadsheet.

The way it uses sideways ram banks means that it can't run on the older Model B, although some rom/ram upgrades may be able to cope with it. Unfortunately there doesn't appear to be any allowance for running it on the Archimedes either.

The spreadsheet is an unusual and useful idea, enabling students quickly to make comparative costings of a number of different circuit designs that resolve the same problem.

Even though the prices quoted will, of course become out of date the spreadsheet format ensures that they can be easily updated, and in any case they will still give a valid comparative assessment.

The software, initiated with the familiar Shift+Break, has an attractive title screen with a line drawing of a baby in an incubator – a design for monitoring premature babies was produced by one of the schools involved in the early trials.

From there on it is menu-driven, working entirely in Mode 0. Although the menus can be a bit slow and require direct number entry rather than the easier cursor then Return technique, some key short cuts speed the process a bit.

However, QuickTrack is more than just the software. It is intended to be seen as a complete educational package that integrates with the design and technology areas of the National Curriculum which, incidentally, makes it far harder to assess its value.

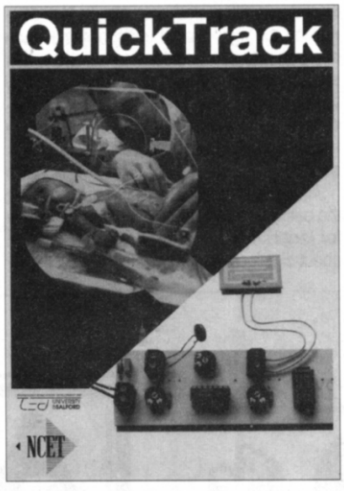
Quite early in the manual there is a fairly detailed suggested plan for progression through the entire Curriculum, with the sections that lend themselves to the use of QuickTrack highlighted.

QuickTrack has obviously been designed with the classroom in mind and has been subjected to extensive trials in schools. This becomes obvious at the small detail level, particularly the way the data sheets are printed on heavy, plastic coated paper. They should survive a lot of thumbing from sticky paws.

The electronic sub-systems have been designed to work from safe voltages in the 5v to 9v range and have been laid out in such a way that they will connect together reasonably easily.

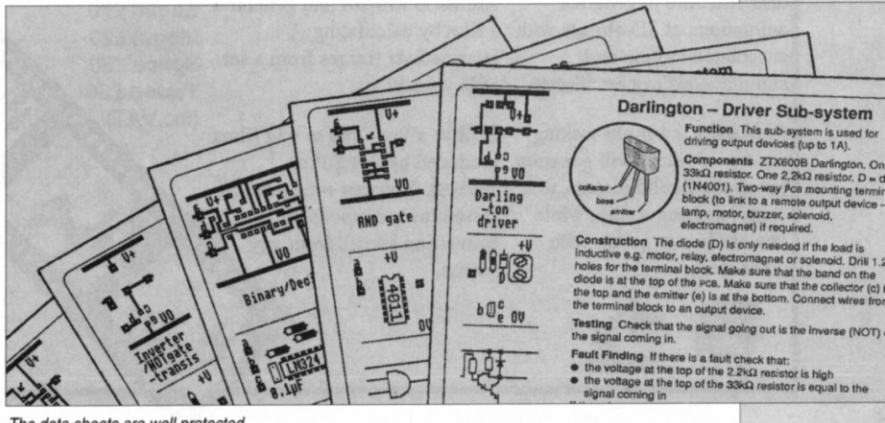
If a school needs a particular sub-system there are instructions on how to go about making one that fits in with the existing set.

When editing your on-screen design, the top part of the display is the PCB track layout, underneath which is the component overlay and finally the circuit diagram.



When you select a new sub-system for inclusion in your design a rectangular frame is displayed under cursor key control so that you can correctly align it with the existing sections.

I found this alignment process a little tricky, as was the alignment of components ➤



The data sheets are well protected

when making up a new sub-system.

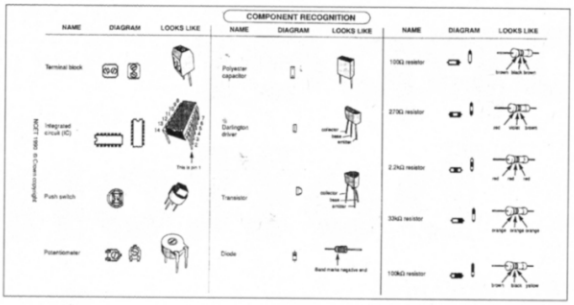
The final result can be run off on an Epson-compatible printer. There are several printing weights, so you can be sure of optimum density for photocopying the artwork to copper laminate. You will, however, need a good printer with no tendency to variations in line feeds.

Considerable information is given about handling the chemicals and other materials for PCB manufacture. This includes the need to make students aware of the health hazards associated with these materials.

Although not mentioned in the manual, this could be a useful point to insert some environmental considerations into overall design and technology discussion.

One of the problems students often have in understanding electronic circuits is that of making the right mental transpositions when components are upside-down or sideways on. This I feel is likely to be aggravated by the display's Mode 0 resolution and the necessary compression when attempting to fit the circuit, layouts and text all into one screen.

There is, however, an option for turning the entire screen over to the copperwork only for larger designs. If you were concerned about circuit clarity I suppose you could draw the designs out, or more usefully teach your students to do so. You will still gain the benefit of the accurate PCB layouts that QuickTrack can produce.



QuickTrack pays a lot of attention to detail

Another questionable idea must be the fact that the PCB copperwork is drawn reversed. The idea is that the students can then see the component overlay in the same orientation as the copperwork, which initially will reduce mistakes.

However, this could actually make the situation worse when the students try to trace faults on the final result. This will then seem wrongly laid out, when it is in fact the real world situation. However, I don't think it would take long for most children and teenagers, who are quite flexibly minded, to become familiar with reversed images.

Summing up

QuickTrack is remarkably inexpensive considering the obvious care and attention that has gone into its development. For small projects is quite adequate, and with proper supervision should be very useful, needing comparatively little preparatory work.

However, with such a computer and electronics intensive package, there is always the risk that some students will become more interested in the process of making circuits than in the problem solving exercise this is intended to represent.

Ace Computing

RISC OS Euclid is the best multi-tasking 3D graphics and animation system for the Archimedes. It is effectively a 3D version of Draw.

Mogul makes full use of **Euclid**'s unique hierarchical data structure to generate animations of 3D objects with articulated motion and simultaneous camera motion.

ArcLight is a multi-tasking ray-tracer which will generate a realistic Euclid picture, or a complete Mogul film, while you are free to get on with other work.

Tween produces films from Draw files. It uses techniques similar to **Mogul** and generates a film by calculating intermediate frames from a set of key positions.

Splice allows you to edit films produced by **Mogul** or **Tween**. You can even produce hand-drawn cartoons by converting sprites from any source.

Such is the enthusiasm for **Euclid** there is a user group called **Elements** , now in its second year, which provides a quarterly disk containing hints, tips, animations and user pictures.

ArcLight £50
Euclid £70
Mogul £20
Splice £30
Tween £30
(inc.VAT)

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Now showing...

Here's a useful debugging aid from the micro of Matthew Chilton

WHEN debugging ARM code it's very useful to be able to view the contents of the registers as you go. The Archimedes does provide help in the form of the Debugger, but you have to write a long support routine to use it – and it may not be worth the effort.

However, here's a handy little relocatable module that will display the contents of registers r0 to r7 in just one SWI instruction.

All you have to do is include the instruction:

```
SWI "Debug_ShowR0"
```

to have an instant display of it. Due to the way the ARM swaps registers around only r0 to r7 are available for this technique but to look at r8 to r14 a simple MOV instruction will do the trick.

If you are examining the contents of a register while executing a loop you might find the value being written all over the screen, making it impossible to follow. This too is easily remedied by putting the instruction:

```
SWI 256+30
```

just before the show register command. This causes an Ascii value 30 to be sent to the VDU drivers which in turn has the effect of putting the text cursor in the top-left home position.

The final bonus of this module is that because it is so short – just 476 bytes – it's worth loading it right at the start of your session and using it for all your projects.

```
   10 REM > Source
   20 REM by Matthew Chilton
   30 REM (c) The Micro User
   40 :
   50 dir$="$"
   60 DIM code% &400
   70 FOR pass%=4 TO 6 STEP 2
   80 P%=0:O%=code%
   90 :
  100 [OPT pass%
  110 EQUD 0 ; Module won't be run
  120 EQUD 0 ; No initialisation
  130 EQUD 0 ; No finalisation
  140 EQUD 0 ; Module doesn't accept ser
vice calls
  150 EQUD title
  160 EQUD helpstring
  170 EQUD 0
  180 EQUD &6080
  190 EQUD swi_intercept
  200 EQUD swi_table
  210 EQUD 0
  220 .title EQUS "DebugAid"+CHR$0:ALIGN
  230 .helpstring EQUS "Debugging Aid"+C
HR$9+"1.00 (08 Jul 1990)"+CHR$0
  240 ALIGN
  250 ;
  260 .swi_table
  270 EQUS "Debug":EQUB 0
  280 ]:FOR L%=0 TO 7
  290 [OPT pass%
  300 EQUS "ShowR"+STR$L%:EQUB 0
  310 ]:NEXT:[OPT pass%
  320 EQUB 0:ALIGN
  330 ;
  340 .buffer EQUD 0:EQUD 0:EQUD 0
  350 ;
  360 .swi_intercept
  370 STMFD R13!,{R0-R10,R14}  ; R14 wil
l be corrupted when a SWI is called
  380 ADR R0,show              ; address
 of first subroutine
  390 MOV R1,#36               ; length
of one subroutine
  400 MUL R1,R11,R1            ; calcula
te offset to our subroutine
  410 ADD PC,R0,R1             ; jump to
 our subroutine
  420 ;
  430 .show
  440 ]:FOR reg=0 TO 7
  450 [OPT pass%
  460 LDMFD R13,{R0-R10,R14}
  470 MOV R0,reg
  480 ADR R1,buffer
  490 MOV R2,#12
  500 SWI "OS_ConvertHex8"
  510 SWI 256+ASC("&")
  520 SUB R1,R1,R0
  530 SWI "OS_WriteN"
  540 LDMFD R13!,{R0-R10,PC}^
  550 ]:NEXT
  560 NEXT
  570 :
  580 OSCLI"Save "+dir$+".DebugMod "+STR
$~code%+" "+STR$~O%
  590 OSCLI"SetType "+dir$+".DebugMod Mo
dule"
  600 OSCLI"Run "+dir$+".DebugMod"
```

SUBSCRIBE NOW!

If you prefer to save the wear and tear on your fingers you'll find this listing – together with all the others from this issue – on this month's disc, sent free if you subscribe to *The Micro User*.

```
  10 =    0 0     150 = B53F 2     290 = 95CD 1
  20 =    0 0     160 = E88E 4     300 = 1D5A 2
  30 =    0 0     170 = AED4 9     310 = 5E58 8
  40 = 9719 9     180 = 4C1D A     320 =  893 3
  50 = 66A6 C     190 = 8D7D B     330 = 8738 B
  60 = 6C55 2     200 = 8C31 C     340 = 281E 7
  70 = ED95 D     210 = AED4 F     350 = 8738 E
  80 = AAAE 7     220 = 4D5C D     360 = D6F0 B
  90 = 9719 C     230 =  CC0 1     370 = 41F0 5
 100 = 95CD 4     240 = 24FA 0     380 = 7067 2
 110 = F90B 8     250 = 8738 C     390 = B542 3
 120 = 7B55 4     260 = E09A 5     400 = FC80 1
 130 = A01B E     270 = 901A 5     410 =  C88 D
 140 = DE08 3     280 =  626 C     420 = 8738 6
```

Get it right ✓

```
 430 = 391B B     520 = 4105 A
 440 = 2A37 A     530 = 2355 6
 450 = 95CD 4     540 = C8F7 F
 460 = BCA5 3     550 = DA42 D
 470 = C945 1     560 = 2C83 1
 480 = A7A0 2     570 = 9719 0
 490 = 2C13 0     580 = 4A08 E
 500 = 4848 E     590 = BB77 1
 510 = AD82 D     600 = 471C E
```

Chess 3D

(requires RISC-OS and 1Mb memory)

"QUALITY ARCHIMEDES SOFTWARE FROM MICRO POWER – the Publishing House that brought you over 70 superb programs for the BBC Micro and over 40 for the Acorn Electron".

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- The program is fully integrated with RISC-OS multi-tasking and windowing system. For instance, you can close down the main window after moving, work on some other application, and then return to find your chess game has been progressed.
- As you would expect all moves are validated and the program accommodates Castling, 'En Passant' and all-piece promotion. Full advantage has been taken of the speed of the Archimedes.

TRIAL OFFER

Cut-down version of program (player v player only) available at £2.95 to enable you to experience the graphics. This is completely refundable against purchase of the full game.

AUTHORS

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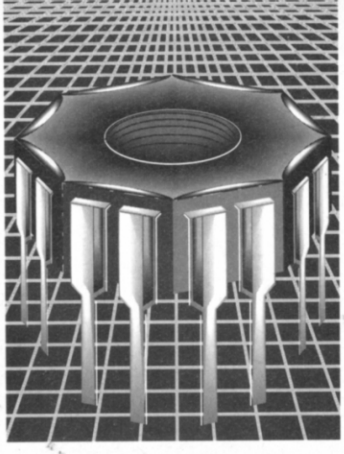

Make re-using procedures and functions much easier with Graham Kendall's new utility

LIST without LOAD

IF you try to write programs by using functions and procedures wherever possible you will soon realise that you use the same routines over and over again. Or at least you would if only you could find them when you want them.

What happens more often than not is you re-write them every time thay are needed, probably using a different name. If you do this you are not only wasting time but are not using tried and tested procedures, so your new program may not be a reliable as it could be.

The solution is simple – from now on use this program, which does away with the need to re-write procedures or load and list programs.

It will list every procedure and function within a program and also tell you the line number where the function has been defined. And to do this the program does not even have to be loaded.

It works by reading the Basic program into a buffer a line at a time and then skips the line number, line length bytes and any leading spaces looking for a non-space character.

When it finds one it checks to see if it has a value of &DD and, if so, it knows a procedure or function is about to be defined because &DD is the Basic token for DEF.

The program now searches for the next non-space byte and checks that it contains either &A4 or &F2 – the Basic tokens for FN and PROC. If something different is found it simply prints *Error* and carries on.

Otherwise it stores the appropriate type name in a string ready for printing. The name of the string is also acquired. Finally the type, name and line number are displayed either on screen or printed.

When you run the program you will be asked to enter a filename. A check is made to ensure the file exists (if you're using disc) and that it is a Basic program by looking at the first byte. Every Basic program starts with a Return (&0D). You are then asked if you want to print the output. Typing *Y* will ensure that the necessary commands are issued at the relevant places. Once the program has listed the procedures and functions you will be asked if you want to look at another file.

So type in the listing, ensuring you've made no typing errors using the checksums and then save it as PF-List. You can run it on the saved version of itself to see it work.

By using this program it should be easier to find a procedure or function that you know you have written but you cannot remember which program it is in. Or you could print the output for all your programs and keep the listings to hand – it could save you hours in program development time.

How Basic stores programs

A line of Basic is held in a standard format. The first byte in a program is always a Return. Following this is the line number, held in two bytes, then a byte containing the length of the line and finally the Basic statement terminated by a Return.

Take this short example program.

```
10 PRINT "Hello"
```

This would be stored as follows (all numbers in HEX):

```
0D 00 0A 0E 20 F1 20 22 48 65 6C 6C 6F 22
0D FF
```

The first 0D is the Return at the beginning of every program. The next two bytes (00 and 0A) is the line number, in our case 10.

The 0E byte is the length of the line. In decimal this is 14, it includes the line number and Return for that line. In our program the &0E includes the bytes 00 0A 0E through to 6C 6F 22 and 0D.

After the length of line byte is the rest of the line stored in Ascii form except for the Basic statements which are tokenised. Therefore the &F1 byte is the PRINT statement after it has been tokenised.

The final byte (&FF) tells Basic that it has reached the end of the program.

Just for completeness it should be noted that not all statements are fully tokenised. For example TOP is tokenised as the TO statement (&B8) with an Ascii P (&50) following.

Also line numbers following statements such as GOSUB and GOTO are stored in a special format and not as Ascii or binary numbers.

Basic tsokens

When you write a Basic program certain parts of it are compressed to one byte. For example you might think the PRINT statement would take up five bytes. In fact this statement is held in one byte as Hexidecimal F1 (&F1).

Unless you want to look at Basic programs in memory or look at them on the disc this tokenisation process need not concern you. The machine takes care of it.

When you type in a program the Basic keywords are converted to tokens. When you LIST the program the process is reversed and the tokens are converted back to their full statements.

To look at a program in its tokenised form type "*DUMP filename" using the name of a saved Basic program.

➤

```
10REM PF-List
20REM by Graham Kendall
30REM (c) The Micro User
40PROCInit
50ON ERROR GOTO 250
60REPEAT
70MODE 7
80Mode%=7
90PROCInitVariables
100PROCGetFileName
110PROCPrint
120MODE 3
130Mode%=3
140REPEAT
150PROCProcessNextLine
160UNTIL End_Of_File
170CLOSE#0 : File=0
180PROCCn("End of List",22):PROCSpace(
24)
190MODE 7
200Mode%=7
210ans%=FNAsk("Another File?")
220UNTIL ans%=FALSE
230END
240:
250REM ++ Error Routine ++
260ON ERROR OFF
270IF Printing% Printing%=FALSE:PRINT:
*FX3,4
280IF Mode%=3 MODE 7:Mode%=7 ELSE CLS
290IF File<>0 CLOSE#File:File=0
300IF ERR=17 IF NOT INKEY-1 GOTO 50
310IF ERR>127 PROCErr("File Error!"):G
OTO 50
320REPORT:PRINT" at line ";ERL:END
330:
340DEF PROCInit
350Title$="Function/Procedure Display"
360LoAlfa$="abcdefghijklmnopqrstuvwxyz
"
370HiAlfa$="ABCDEFGHIJKLMNOPQRSTUVWXYZ
"
380Numeric$="0123456789_`"
390AlfaNum$=LoAlfa$+HiAlfa$+Numeric$
400Printing%=FALSE
410DIM Buffer% 256
420oscli%=&FFF7
430File=0
440ENDPROC
450:
460DEF PROCInitVariables
470ans%=TRUE
480Page%=1
490Line_Cnt%=0
500IF File<>0 CLOSE#File:File=0
510End_Of_File=FALSE
520Printing%=FALSE
530ENDPROC
540:
550DEF PROCGetFileName
560File=0
570REPEAT
580REPEAT
590REPEAT
600CLS
610PROCPrintTitle_1
620PROCCn("Which file do you wish to u
se"+CHR$(&0A)+CHR$(&0D),10)
630INPUT File$
640IF LEFT$(File$,1)="*" CLS:PROCOScom
mand(File$):PROCSpace(24)
650UNTIL File$="" AND LEFT$(File$,1)<>
"*"
660File=OPENIN(File$)
670IF File=0 PROCErr("File does not ex
ist")
680UNTIL File<>0
690B%=BGET#File
700IF B%<>&0D CLOSE#File:File=0:PROCEr
r("This is not a BASIC program")
710UNTIL B%=&0D
720ENDPROC
730:
740DEF PROCOScommand($Buffer%)
750LOCAL X%,Y%
760X%=Buffer% MOD 256
770Y%=Buffer% DIV 256
780CALL oscli%
790ENDPROC
800:
810DEF PROCPrint
820Print%=FNAsk("Do you wish to print
output?")
830ENDPROC
840:
850DEF PROCProcessNextLine
860PROCReadNextLine
870IF End_Of_File ENDPROC
880PROCReadLineNumber
890IF Line_Num%>&8000 End_Of_File=TRUE
:ENDPROC
900I%=3
910B%=FNGetNonSpace
920IF B%=&0D PROCDisplay
930ENDPROC
940:
950DEF PROCReadNextLine
960I%=0
970REPEAT
980B%=BGET#File
990Buffer%?I%=B%
1000I%=I%+1
1010IF EOF#File End_Of_File=TRUE
1020UNTIL (B%=&0D AND I%>3) OR End_Of_F
ile
1030ENDPROC
1040:
1050DEF PROCReadLineNumber
1060Line_Num%=Buffer%?0*256+Buffer%?1
1070ENDPROC
1080:
1090DEF FNGetNonSpace:LOCAL B%
1100REPEAT B%=FNNextByte:UNTIL B%<>&20:
=B%
1110:
1120DEF FNNextByte:LOCAL B%
1130B%=Buffer%?I%:I%=I%+1:=B%
1140:
1150DEF PROCDisplay
1160IF Line_Cnt%=0 PROCPrintTitle_2
1170Line_Cnt%=Line_Cnt% +1
1180Name$=FNGetName
1190LnNum$=RIGHT$(STRING$(5," ")+STR$Li
ne_Num%,5)
1200IF Print% Printing%=TRUE:*FX3,10
1210PRINT Type$TAB(11)Name$TAB(73)LnNum
$
1220Printing%=FALSE:*FX3,4
1230IF Line_Cnt%=13 PROCNewScreen
1240ENDPROC
1250:
1260DEF FNGetName
1270Name$=""
1280Type$=FNProcOrFn
1290IF Type$="Error" THEN=Name$
1300REPEAT
1310B%=FNNextByte
1320Name$=Name$+CHR$(B%)
1330UNTIL INSTR(AlfaNum$,CHR$(B%))=0
1340Name$=LEFT$(Name$,(LEN(Name$)-1))
1350=Name$
1360:
1370DEF FNProcOrFn
1380Type$=""
1390B%=FNGetNonSpace
1400IF B%=&A4 Type$="Function"
1410IF B%=&F2 Type$="Procedure"
1420IF Type$="" Type$="Error"
1430=Type$
1440:
1450DEF PROCNewScreen
1460IF NOT Print% PROCCn("More Follows"
,22)
1470IF NOT Print% PROCSpace(24)
1480Line_Cnt%=0
1490Page%=Page%+1
1500CLS:ENDPROC
1510:
1520DEF PROCErr(Msg$)
1530PROCCn(Msg$,22)
1540PROCSpace(24)
1550ENDPROC
1560:
1570DEF PROCCn(t$,Y%)
1580IF Mode%=3 g%=39 ELSE g%=19
1590LOCAL X%:X%=g%-LEN t$/2
1600PRINTTAB(X%,Y%)t$;:ENDPROC
1610:
1620DEF PROCSpace(Line%)
1630PROCCn("Press Space to Continue",Li
ne%)
1640REPEAT UNTIL GET=32
1650ENDPROC
1660:
1670DEF FNAsk(A$)
1680REPEAT CLS:PROCPrintTitle_1
1690PROCCn(A$,10):A%=INSTR("YyNn",GET$)
1700UNTIL A%>0
1710IF A%=1 OR A%=2 A%=TRUE ELSE A%=FAL
```

```
          Procedures and Functions in Program PF-List (Page 1)

Type        Name
----        ----
Procedure   Init
Procedure   InitVariables
Procedure   GetFileName
Procedure   OScommand
Procedure   Print
Procedure   ProcessNextLine
Procedure   ReadNextLine
Procedure   ReadLineNumber
Function    GetNonSpace
Function    NextByte
Procedure   Display
Function    GetName
Function    ProcOrFn


                        More Follows
                    Press Space to Continue
```

caption

Hard Drive Options From The Serial Port

We produce a range of hard drive upgrade options for the Archimedes range of computers. The controller card can be based either on the **SCSI** or **IDE** interface standards and drives come in many capacities for internal (300/400 series) or external connection. The hard drives used are high quality **Seagate** devices which are all fully guaranteed for one year.

SCSI is becoming the Archimedes 'standard' choice due to the range and number of devices you can connect to the interface - such as tape streamers, scanners printers, CD-ROM drives etc as well as hard drives. Our SCSI package uses our **fast 8-bit interface podule** - also available as an **internal A3000 card** at no extra cost - and Acorn SCSI compatible software.

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For a full specification sheet please contact us.

"Frankly, I think the addition of such a board should be a very high priority. An upgrade equal to adding an ARM 3 board, and cheaper...The Serial Port promises us that the board will be something very special and I am inclined to agree. I think that the Graphics Enhancer will appeal to a massive Archimedes market." **Computer Shopper April 1991**

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All prices exclude VAT. SCSI and IDE systems can be installed by us for an extra £25 - otherwise delivery is £10.

```
➤
SE
 1720CLS:=A%
 1730:
 1740DEF PROCPrintTitle_1
 1750PROCCn(CHR$(141)+Title$,1)
 1760PROCCn(CHR$(141)+Title$,2)
 1770ENDPROC
 1780:
 1790DEF PROCPrintTitle_2
 1800IF Print% AND Page%=1 Printing%=TRU
E:*FX3,10
 1810PROCCn("Procedures and Functions in
 Program "+File$+" (Page "+STR$(Page%)+"
)",2)
 1820IF Print% AND Page%=1 PRINT:Printin
g%=FALSE:*FX3,4
 1830PRINTTAB(0,4)"Type"TAB(11,4)"Name"T
AB(74,4)"Line"
 1840PRINTTAB(0,5)"ÑÑ"TAB(11,5)"ÑÑ"T
AB(74,5)"ÑÑ"
 1850ENDPROC
```

Get it right ✓

```
  10 =    0 0    160 = F340 E    310 = 8364 4    460 = BFE6 C    610 =   3D2 3    760 = 33F8 4
  20 =    0 0    170 = 4C6D E    320 = FA32 F    470 = 3D68 4    620 = DFD9 1    770 = DF5F 9
  30 =    0 0    180 = 8D58 C    330 = 9719 A    480 = 533D 2    630 = B63D F    780 = 58E6 9
  40 = E9F5 5    190 = 1092 9    340 = 7799 4    490 = 2583 2    640 =    AD 2    790 = ED0F D
  50 = 262C 4    200 = 80FB 1    350 =    B7 9    500 = 6CB0 A    650 = B02B 9    800 = 9719 C
  60 = BFBA 9    210 = 16D7 3    360 = 5F2A B    510 = DA57 4    660 = 913E 6    810 = BD68 B
  70 = 1092 C    220 = FB0C 9    370 = 9B52 B    520 = 2E13 6    670 = 2EFD E    820 = A0D9 5
  80 = 80FB 2    230 = FD2E 3    380 = 60C5 E    530 = ED0F C    680 = 8D6C F    830 = ED0F 6
  90 = BCD2 A    240 = 9719 4    390 = C03E C    540 = 9719 3    690 = 8994 4    840 = 9719 2
 100 = 5A95 B    250 =    0 4    400 = 2E13 7    550 = A064 E    700 = 7D09 E    850 = A1D9 D
 110 = B31F 9    260 = F4C9 1    410 = 5AE0 4    560 = 75B0 D    710 = 9370 0    860 = DBF9 6
 120 = 5016 5    270 = FE7D 5    420 = B44E E    570 = BFBA B    720 = ED0F 4    870 = C1A9 3
 130 = C07F 1    280 = EB73 8    430 = 75B0 4    580 = BFBA 6    730 = 9719 4    880 = 5E63 7
 140 = BFBA C    290 = 6CB0 A    440 = ED0F F    590 = BFBA 3    740 = 6B22 A    890 = 4C84 E
 150 = 825D 1    300 = DF0A 1    450 = 9719 D    600 = 7A16 E    750 = 71F6 F    900 = 8524 D
 910 = EF40 F
 920 = C58D 8
 930 = ED0F 7
 940 = 9719 5    1250 = 9719 6    1560 = 9719 9
 950 = 64AC 8    1260 = C922 8    1570 = B066 8
 960 = B547 2    1270 = 5685 A    1580 = 5C2B 1
 970 = BFBA 2    1280 = FD26 D    1590 = B541 E
 980 = 8994 6    1290 = FF92 B    1600 = DF37 0
 990 = 9AEB 2    1300 = BFBA C    1610 = 9719 2
1000 = A10E 0    1310 = 1A0E 3    1620 = 6B54 1
1010 = 3AF7 5    1320 = 85F5 7    1630 = 6774 E
1020 = DC28 D    1330 = 7DCE 2    1640 = 2B9E B
1030 = ED0F E    1340 = 65A5 9    1650 = ED0F 8
1040 = 9719 8    1350 = D96A 2    1660 = 9719 9
1050 = 5A00 9    1360 = 9719 C    1670 = 5B50 2
1060 = 8429 1    1370 = 6A85 1    1680 =   EC3 2
1070 = ED0F 0    1380 =   A5C 9    1690 = 56A4 9
1080 = 9719 A    1390 = EF40 9    1700 = B29C 6
1090 = 49AE 8    1400 = 248E 8    1710 = 4FBE C
1100 = 9896 5    1410 = 3C85 3    1720 = 5291 E
1110 = 9719 9    1420 = 54A6 0    1730 = 9719 8
1120 = 2A83 4    1430 =   4C8 4    1740 = BC87 F
1130 = CF78 A    1440 = 9719 8    1750 = AC25 1
1140 = 9719 5    1450 = 813B E    1760 = F976 E
1150 = 6C0A F    1460 = 29F0 C    1770 = ED0F 7
1160 = FC1B F    1470 = 98D8 4    1780 = 9719 1
1170 = 2071 2    1480 = 2583 8    1790 = 8CE4 9
1180 = E274 1    1490 = 88E4 3    1800 = 9F7A D
1190 = DA27 8    1500 = 9234 D    1810 = D2F0 6
1200 = 3227 0    1510 = 9719 D    1820 = 93E3 9
1210 = 25CB 4    1520 = 59A3 A    1830 = A76D 8
1220 = 146F 0    1530 =   78D 7    1840 = 555A B
1230 = 92ED 9    1540 = B10A 3    1850 = ED0F 9
1240 = ED0F B    1550 = ED0F C
```


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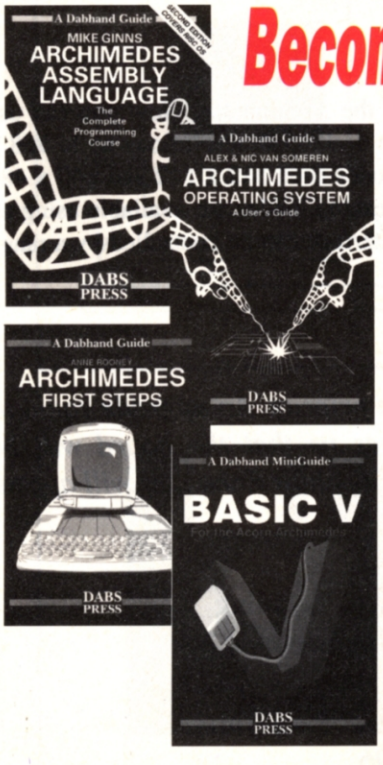

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To order, please use the form on Page 113

Abstract thought

Petra Galloway finds a new way to present her calculations

MATHEMATICAL equations have always been the bane of typesetters – and, more recently, DTP exponents – because rather than everything proceeding along a line, as does this text, there are superscripts, subscripts, divisions with things underneath, bits in brackets, esoteric symbols and numerous other complications.

While Equasor won't solve every problem, it can handle most of them.

What you get is a manual – not too long – and a disc containing the software, a couple of specialised fonts and some examples.

The fonts have to be loaded into your !Fonts directory and you will need the Acorn Outline Font Manager.

Equasor is loaded up in the usual way and its icon is the maths *summation* symbol that looks vaguely like an E – cute. Clicking on the icon brings up the expected empty sheet, plus a complex-looking toolbox. The package is quite intuitive in use and a quick run through the examples in the manual will soon have you familiar with it.

Simple one line equations are easy and you don't need something like Equasor to draw them – or do you?

There are a number of conventions when typesetting equations, and this software gives you them automatically. For example, operators like *sine* and *cosine* – available from the main menu – are in the normal font, initially Trinity Medium, while variables typed in by you are in Trinity Italic.

As you would expect, their style can be altered easily using menu options and dialogue boxes. The obscure symbols come from the MathGreek font. They are either automatically inserted, depending on items from the toolbox you've chosen, or selected directly from a grid showing all available characters.

You can add other fonts to the list so extending the package's capabilities.

Let's get on to the actual equation generation: You can't just start typing, you have to select New Equation from the Edit sub-menu because you must use a pair of crosshairs to set the start of your equation on the empty page.

The principle that Equasor works on is very simple. Let's say you want the formula for the distance between two points in 3D space: You type in the first variable, *x* which now needs to have a subscript of *a*, so you highlight it by dragging across or just double-clicking. Now adjust the toolbox options to give you subscripts, and click on the super/subscript option.

The variable becomes unhighlighted, but the cursor is now in the subscript position, so just type *a* which appears 75 per cent of the size of the text to which it's attached. A sub-subscript will be at 75 per cent of 75 per cent, and so on.

Now you move the cursor forward, and it goes to the superscript position, which we don't want. Right again takes us to a position to type in a minus sign.

When the next space is typed the minus sign moves and spaces out for better clarity. The amount of space can be set by the Preferences icon bar menu option.

The process of variable and subscript is repeated for subscript. Now we need parentheses – round brackets – enclosing this operation. So we highlight the whole thing by dragging and click on the appropriate brackets option in the toolbox, highlight the whole thing again and this time add a superscript of 2.

Constants appear in upright roman font as opposed to italic.

This process is repeated for the *y* and *z* components, then the whole equation highlighted for the addition of the square root symbol. Finally the d_{ab} can be added at the start.One of the crucial points to note is that at no time do you have to specify how big a symbol has to be – Equasor automatically adjusts as you go.

The example shown here is very simple and the entire sequence – utilising the cut and paste operations available from the keyboard – took just a couple of minutes.

Complex equations can be produced just as easily and there is a special user-definable operation, so if you need superscript prefixes and subscripted postfix symbols you can include these easily.

Equasor can't as yet handle matrices as single units of row and column data, and if you need the MathGreek symbols in bold you are snookered. However this is really a small loss when you consider the overall power of the system.

Equations can be saved in either Equasor or Drawfile format. The latter can be loaded into any DTP software, but can't be re-loaded into Equasor itself.

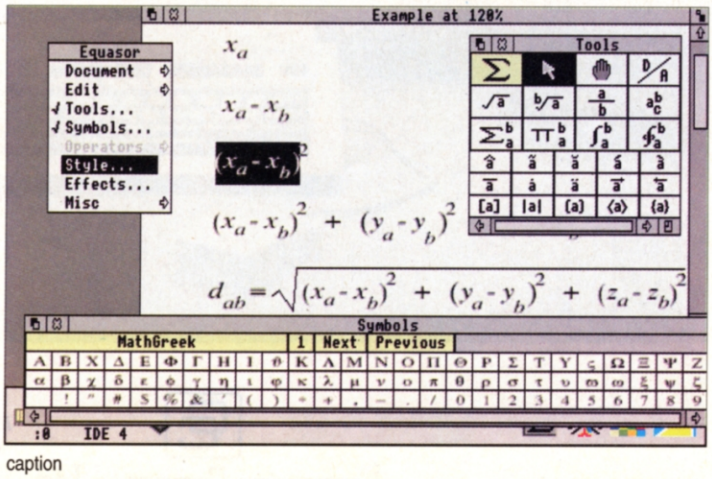
The Equasor format itself can be loaded direct into Impression, as you might expect, and back into the original software.

Product: Equasor
Price: £56.35
Supplier: Computer Concepts Ltd., Gaddesden Place, Hemel Hempstead, Herts HP2 6EX.
Tel: 0442 63933

Summing up

Equasor is an astonishing package. It's so easy to use that I cringe thinking back on the hours I've spent painfully drawing out equations only to find bits didn't fit and having to redraw them all over again.

This is a must for anyone who needs to create equations for printing.



caption

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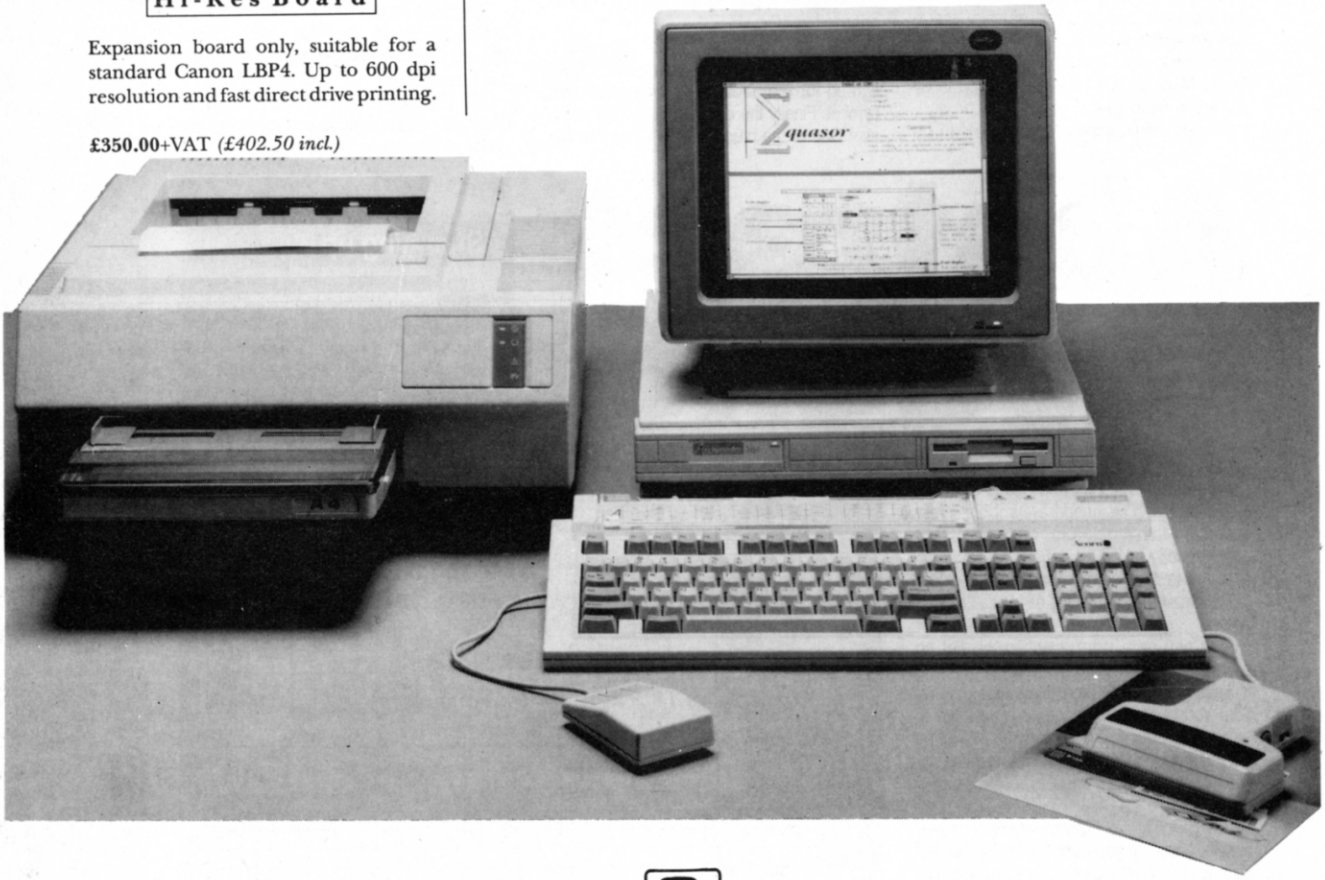

Illustration features Archimedes, Scan-Light Junior and Laser-Direct HI-Res.

Computer Concepts Ltd

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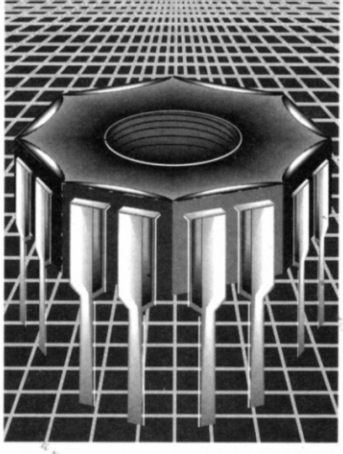


An evaluation of sorts

John Tissandier presents a system for ensuring you choose the best technique

SORTING items in a list is a common activity, particularly in database applications, but deciding which technique to use can prove difficult. Should you opt for the bubble sort – or will it be too slow? Well, here's a program that will help you decide which to go for.

The Sort Evaluator tests the relative speed of various sorting methods for different numbers of items. It can be used to compare various traditional methods, or to develop and optimise your own versions.

Because of the way it is organised you can leave the program running and obtain a wide range of results, saving time and effort. The following facilities are available:

- Set maximum number of items that are to be sorted.
- Set number of random data sets – to obtain a mean.
- Select which sorts are to be tested.
- Display results consisting of minimum, maximum and mean time in centiseconds for each sort.
- Print out of results shown on screen.
- Produce file of results compatible with Inter-Chart if graphs required.

Three sorting methods are included – bubble, quick and shell – but the program has been designed so that you can add further ones easily.

The number of items to be sorted is given in the form of 2 to the power of *n*. For example if *n* is 7 the following numbers of items will be sorted:

```
2 4 8 16 32 64 128
```

The program checks that values entered aren't too low, but there is no validation on the upper limit – this will depend on hardware and memory available.

A random set of integers in the range 1 to 9999 is then generated and the same data set will be used for each sorting method being tested. A number of sets can be produced and the program will run through these in turn for each technique.

Answering *Y* to Display output from sort? will display data once it has been sorted so you can check that a technique is working correctly. Once you know all is well it's best not to use this option as you have to press Space and Shift repeatedly.

If you select to write to a file the mean times only are used and are output in an Inter-chart compatible form. That is, it consists of *x,y* pairs separated by commas, where *x* is number of items sorted and *y* is the time taken in centiseconds. The program automatically inserts the point 0,0 at the beginning of the file.

Filenames are created automatically by taking up to seven characters from the name of the sorting method and adding the directory I. If you are using ADFS you'll have to ensure that the I directory exists before you try using it.

Type in the program and make sure you've made no typing errors using the Get it Right! checksums. Then run it – you can experiment with the options without causing any problems and discover which sort of sort is best.

Adding a sort

The following steps are required to add your own sort:

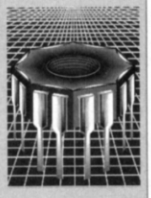
- Increment the total number of sorts at DATA line 290.
- Add the name of the sorting method at DATA line 300.
- Append a routine to the end of the program which should be a function which sorts an array *data%()* from 1 to parameter *n%*. The generalised swap procedure PROCswap(a%,b%) may be called if required.

Using Inter-Chart

To produce graphs of the results via the Inter-Chart rom just follow these steps:

- Run the program answering *Y* to the *Save to disc*?
- Call Inter-Chart.
- Choose option 5 to enter graph name with a scaled graph type.
- Choose option 9 to import file – the filename required will have been displayed.
- Repeat the last two steps for other graphs.
- Choose option 7 to display graph.
- Press f0 to overlay other graphs.
- Adjust range and add headings if required.
- Press f4 to print.

```
 10 REM SORT EVALUATOR
 20 REM by John Tissandier
 30 REM (c) The Micro User
 40 ON ERROR GOTO 200
 50 MODE 7
 60 PROCheading
 70 PROCparameters
 80 PROCcheck_progress
 90 FOR set%=1 TO sets%
100 PRINT TAB(10,3);set%
110 PROCcreate_data
120 FOR sort%=1 TO sorts%
130 PROCcall_sort
140 NEXT
150 NEXT
160 PROCdisplay_results
170 a%=field%
180 END
190 :
200 REM Error routine
210 VDU 3,7
220 CLOSE#0
230 MODE 7
240 REPORT:PRINT " at line ";ERL
250 END
260 :
270 REM ++ DATA ++
```



```
  280 :
  290 DATA 3
  300 DATA Bubble,Quick,Shell
  310 :
  320 DEFPROCheading
  330 LOCAL i%
  340 FOR i%=0 TO 1
  350 PRINTTAB(7,i%)CHR$141CHR$134CHR$15
7CHR$(129)" SORT EVALUATOR"SPC3CHR$156
  360 NEXT
  370 VDU 28,0,24,39,4
  380 ENDPROC
  390 :
  400 DEF PROCparameters
  410 LOCAL i%,method$,n%
  420 INPUT "Number of items to sort: 2^
" points%
  430 IF points%<1 points%=5:PRINT'CHR$(
129);"Default = 2^";points%
  440 items%=2^points%
  450 DIM unsorted%(items%),data%(items%
)
  460 INPUT'"Number of data sets: " sets
%
  470 IF sets%<2 sets%=2:PRINT'CHR$(129)
;"Minimum = 2"
  480 READ n%
  490 DIM method$(n%)
  500 sorts%=0
  510 FOR i%=1 TO n%
  520 READ method$
  530 IF NOT (i%=n% AND sorts%=0) IF FNi
nput("Include "+method$+" Sort") sorts%=
sorts%+1:method$(sorts%)=method$
  540 IF i%=n% AND sorts%=0 method$(1)=m
ethod$:sorts%=sorts%+1:PRINT'CHR$129meth
od$" Sort included"
  550 NEXT
  560 DIM time%(sorts%,points%,sets%)
  570 output=FNinput("Display output fro
m sort")
  580 printer=FNinput("Send to printer")
  590 write=FNinput("Save to disc")
  600 field%=@%:@%=&09:len%=0
  610 ENDPROC
  620 :
  630 DEF FNinput(prompt$)
  640 PRINT'prompt$"? ";
  650 *FX21
  660 IF INSTR("Yy",GET$) PRINT "Y":=TRU
E ELSE PRINT "N":=FALSE
  670 :
  680 DEF PROCcheck_progress
  690 VDU 23,1,0;0;0;0;26,12
  700 PRINT'CHR$136"SORTING"
  710 PRINTTAB(0,3)"Data set: "
  720 PRINTTAB(0,5)"Method:"
  730 PRINTTAB(0,7)"Number of items: "
  740 ENDPROC
  750 :
  760 DEF PROCcreate_data
  770 LOCAL i%
  780 FOR i%=1 TO items%
  790 unsorted%(i%)=RND(9999)
  800 NEXT
  810 ENDPROC
  820 :
  830 DEF PROCcall_sort
  840 LOCAL method$,point%,t%
  850 method$=method$(sort%)
  860 len%=len%-LEN(method$):IF len%<0 l
en%=0
  870 PRINTTAB(8,5)method$SPClen%
  880 len%=LEN(method$)
  890 FOR point%=1 TO points%
  900 items%=2^point%
  910 PRINTTAB(17,7);items%SPC9
  920 PROCinit_array
  930 TIME=0:Z%=EVAL("FN"+method$+"(item
s%)"):t%=TIME
  940 time%(sort%,point%,set%)=t%
  950 IF output THEN PROCoutput
  960 NEXT
  970 ENDPROC
  980 :
  990 DEF PROCinit_array
 1000 LOCAL i%
 1010 FOR i%=1 TO items%
 1020 data%(i%)=unsorted%(i%)
 1030 NEXT
 1040 ENDPROC
 1050 :
 1060 DEF PROCoutput
 1070 LOCAL i%
 1080 PRINTTAB(0,1)CHR$137
 1090 IF points%>3 VDU14:PRINTTAB(0,24)"
Press SHIFT to continue";
 1100 VDU 28,0,22,39,9
 1110 FOR i%=1 TO items%
 1120 PRINT data%(i%);
 1130 IF i%<>items% PRINT
 1140 NEXT
 1150 VDU 15,26
 1160 PROCspace
 1170 VDU 28,0,24,39,9,12,26
 1180 PRINTTAB(0,1)CHR$136
 1190 ENDPROC
 1200 :
 1210 DEF PROCspace
 1220 *FX21
 1230 PRINTTAB(0,24)"Press SPACE to cont
inue";
 1240 REPEAT UNTIL GET=32
 1250 ENDPROC
 1260 :
 1270 DEF PROCdisplay_results
 1280 LOCAL quit
 1290 REPEAT
 1300 FOR sort%=1 TO sorts%
 1310 PROCresults
 1320 NEXT
 1330 write=FALSE:printer=FALSE
 1340 IF sorts%>1 VDU 31,0,22,23,1,1;0;0
;0;:quit=NOT FNinput("Display results ag
ain") ELSE quit=TRUE
 1350 IF quit VDU 23,1,1;0;0;0; ELSE VDU
 23,1,0;0;0;0;
 1360 UNTIL quit
 1370 ENDPROC
 1380 :
 1390 DEF PROCresults
 1400 LOCAL fname$,min_time%,max_time,ma
x_time%,mean_time%,point%
 1410 CLS
 1420 IF printer VDU 2,13,13
 1430 PRINT'method$(sort%)" Sort (times
in centiseconds)"
 1440 PRINT'"No. items"SPC6"Min"SPC6"Max
"SPC5"Mean"'
 1450 IF write fname$="I."+LEFT$(method$
(sort%),7):chan%=OPENOUT(fname$):BPUT#ch
an%,48:BPUT#chan%,44:BPUT#chan%,48:BPUT#
chan%,44
 1460 FOR point%=1 TO points%
 1470 min_time%=FNcalculate("min",point%
)
 1480 max_time%=FNcalculate("max",point%
)
 1490 mean_time=FNcalculate("mean",point
%)/sets%:mean_time%=INT(mean_time):IF me
an_time-mean_time%>=0.5 mean_time%=mean_
time%+1
 1500 PRINT 2^point%,min_time%,max_time%
,mean_time%
 1510 IF write PROCwrite(2^point%):PROCw
rite(mean_time%)
 1520 NEXT
 1530 VDU 3
 1540 IF write CLOSE#chan%:PRINT'"Filena
me: ";fname$
 1550 IF sorts%>1 AND sort%<>sorts% AND
printer=FALSE PROCspace
 1560 ENDPROC
 1570 :
 1580 DEF FNcalculate(m$,p%)
 1590 LOCAL set%,result%,time%
 1600 IF m$="min" result%=2147483647 ELS
E result%=0
 1610 FOR set%=1 TO sets%
 1620 time%=time%(sort%,p%,set%)
 1630 IF m$="min" IF time%<result% resul
t%=time%
 1640 IF m$="max" IF time%>result% resul
t%=time%
 1650 IF m$="mean" result%=result%+time%
 1660 NEXT
 1670 =result%
 1680 :
 1690 DEF PROCwrite(val%)
 1700 LOCAL byte%,char%,str$
 1710 str$=STR$(val%)
 1720 FOR char%=1 TO LEN(str$)
 1730 byte%=ASCMID$(str$,char%)
 1740 BPUT#chan%,byte%
 1750 NEXT
 1760 BPUT#chan%,ASC","
 1770 ENDPROC
 1780 :
 1790 REM ++ SWAP PROCEDURE ++
 1800 :
 1810 DEF PROCswap(a%,b%)
 1820 LOCAL temp%
 1830 temp%=data%(a%)
 1840 data%(a%)=data%(b%)
 1850 data%(b%)=temp%
 1860 ENDPROC
 1870 :
 1880 REM ++ BUBBLE SORT ++
 1890 :
 1900 DEF FNBubble(n%)
 1910 PROCbubble(n%):=0
 1920 :
 1930 DEF PROCbubble(n%)
 1940 LOCAL i%,j%,swap
 1950 i%=0
 1960 REPEAT
 1970 i%=i%+1
 1980 swap=FALSE
 1990 FOR j%=n% TO i%+1 STEP -1
 2000 IF data%(j%)<data%(j%-1) PROCswap(
j%,j%-1):swap=TRUE
 2010 NEXT
 2020 UNTIL swap=FALSE OR i%=n%-1
 2030 ENDPROC
 2040 :
 2050 REM ++ QUICK SORT ++
 2060 :
 2070 DEF FNQuick(rhi%)
 2080 PROCquick(1,rhi%):=0
 2090 :
 2100 DEF PROCquick(llo%,rhi%)
 2110 LOCAL mid%,lhi%,rlo%
 2120 mid%=data%((llo%+rhi%) DIV 2)
 2130 lhi%=rhi%:rlo%=llo%
 2140 REPEAT
 2150 IF data%(rlo%)<mid% REPEAT:rlo%=rl
o%+1:UNTIL data%(rlo%)>=mid%
 2160 IF data%(lhi%)>mid% REPEAT:lhi%=lh
i%-1:UNTIL data%(lhi%)<=mid%
```

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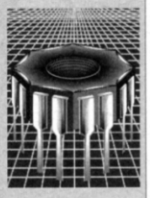

```
➤
 2170 IF rlo%<=lhi% PROCswap(rlo%,lhi%):
lhi%=lhi%-1:rlo%=rlo%+1
 2180 UNTIL rlo%>lhi%
 2190 IF llo%<lhi% PROCquick(llo%,lhi%)
 2200 IF rlo%<rhi% PROCquick(rlo%,rhi%)
 2210 ENDPROC
 2220 :
 2230 REM ++ SHELL SORT ++
 2240 :
 2250 DEF FNShell(n%)
 2260 PROCshell(n%):=0
 2270 :
 2280 DEF PROCshell(n%)
 2290 LOCAL hi%,i%,int%,lo%,swap
 2300 int%=n%
 2310 REPEAT
 2320 int%=int% DIV 2
 2330 FOR i%=1 TO n%-int%
 2340 lo%=i%:hi%=int%+i%
 2350 REPEAT
 2360 swap=FALSE
 2370 IF data%(hi%)<data%(lo%) PROCswap(
hi%,lo%):hi%=lo%:lo%=lo%-int%:swap=TRUE
 2380 UNTIL swap=FALSE OR lo%<=0
 2390 NEXT
 2400 UNTIL int%<=0
 2410 ENDPROC
```

```
  10 =     0 0    260 = 9719 8    510 = 50F4 3    760 = AEC1 8   1010 = 28EB E   1260 = 9719 B   1510 = 9897 B   1760 = 3142 3
  20 =     0 0    270 =    0 8    520 = 5B8F 3    770 = AFF2 9   1020 = F69C F   1270 = 716F 5   1520 = 2C83 9   1770 = ED0F 5
  30 =     0 0    280 = 9719 A    530 =  E52 6    780 = 28EB E   1030 = 2C83 7   1280 = 8D16 8   1530 = 8CD6 A   1780 = 9719 7
  40 = 45DB B     290 = 1023 B    540 = 8C9D 9    790 = 4CBC 2   1040 = ED0F 5   1290 = BFBA 8   1540 = 9CF6 9   1790 =     0 7
  50 = 1092 2     300 = F383 3    550 = 2C83 F    800 = 2C83 C   1050 = 9719 A   1300 = B1AB 3   1550 = 770A F   1800 = 9719 9   2010 = 2C83 C   2220 = 9719 A
  60 = EFB5 7     310 = 9719 F    560 = 6BA8 F    810 = ED0F 6   1060 = E44C D   1310 = 53B7 3   1560 = ED0F 1   1810 = 7C3C 7   2020 = 8FEB A   2230 =     0 A
  70 = 99DD 3     320 =  213 C    570 = 6241 B    820 = 9719 9   1070 = AFF2 2   1320 = 2C83 5   1570 = 9719 A   1820 =  A16 F   2030 = ED0F E   2240 = 9719 B
  80 = D47C D     330 = AFF2 F    580 = A9A0 8    830 = FE6D 9   1080 = 98CF 6   1330 = C9AC 0   1580 = FC39 0   1830 = 640A 2   2040 = 9719 0   2250 = 4FC1 2
  90 = F9A8 5     340 = 5755 3    590 = 187D 1    840 = 7E5B E   1090 = 4712 F   1340 = B259 A   1590 = 22B0 3   1840 = C48D F   2050 =     0 0   2260 = 41FD 1
 100 = 2D67 C     350 = A348 3    600 = 177B 6    850 = AEC4 F   1100 =  3BB 0   1350 = FB37 2   1600 = BBA3 5   1850 = 986A 4   2060 = 9719 9   2270 = 9719 3
 110 = 5430 4     360 = 2C83 4    610 = ED0F E    860 = 4203 3   1110 = 28EB 3   1360 = 5FD3 8   1610 = F9A8 A   1860 = ED0F 0   2070 = 9489 A   2280 = 7D0E B
 120 = B1AB 4     370 = 5FF7 7    620 = 9719 6    870 = 9184 D   1120 = 4665 3   1370 = ED0F 2   1620 = 61F1 1   1870 = 9719 5   2080 = 4DB5 3   2290 = E226 C
 130 =  1AF 0     380 = ED0F 1    630 =  658 1    880 = F676 C   1130 =  157 4   1380 = 9719 D   1630 = 6538 F   1880 =     0 5   2090 = 9719 E   2300 = 83F0 F
 140 = 2C83 F     390 = 9719 4    640 = 8C91 C    890 = 95F8 E   1140 = 2C83 F   1390 = 7EC8 7   1640 = 939C 1   1890 = 9719 C   2100 = FD6F A   2310 = BFBA 7
 150 = 2C83 6     400 = 452D B    650 = B5F5 7    900 =  274 9   1150 = 57D4 9   1400 = 300D 5   1650 = FBA8 5   1900 = 1FC8 9   2110 = 320B A   2320 = 3740 E
 160 = 52EB 3     410 = 9F47 9    660 = 4CBD C    910 = E3B0 D   1160 = 65FC 8   1410 = 7A16 7   1660 = 2C83 E   1910 = 7F22 1   2120 = D5D5 B   2330 = F3D5 6
 170 =  465 B     420 = CEC0 C    670 = 9719 A    920 = 2E1C 1   1170 = 980F 6   1420 = ED1C D   1670 = BB17 B   1920 = 9719 B   2130 = B513 0   2340 = 173D B
 180 = FD2E 0     430 = F49F C    680 = D01F F    930 = 68FA E   1180 = 88EE 9   1430 = F401 D   1680 = 9719 1   1930 = C6D9 A   2140 = BFBA D   2350 = BFBA 9
 190 = 9719 E     440 = 849C 2    690 =  5D2 4    940 = D60B 5   1190 = ED0F D   1440 = 1107 2   1690 = 6B76 8   1940 =  DF0 9   2150 = 165E 8   2360 = F000 B
 200 =     0 E    450 = 64D1 6    700 = 7117 6    950 = ECD8 7   1200 = 9719 5   1450 = 92AD 4   1700 = 8A2D 1   1950 = 8209 8   2160 = A94D A   2370 = 1705 A
 210 = F071 2     460 = 8DD1 C    710 = BF88 F    960 = 2C83 5   1210 = 6B8B 8   1460 = 95F8 5   1710 = 8AB0 4   1960 = BFBA F   2170 = DA09 8   2380 = 4165 1
 220 = 9EE3 1     470 = B3E6 2    720 = 1753 A    970 = ED0F 5   1220 = B5F5 4   1470 = 416A 6   1720 = C7C6 A   1970 = F8B6 4   2180 = BCE5 9   2390 = 2C83 D
 230 = 1092 C     480 = DEB5 E    730 = CE41 E    980 = 9719 7   1230 = 456A 3   1480 = 29D9 D   1730 = 4397 3   1980 = F000 B   2190 = F456 E   2400 = 9C8A 2
 240 = CDBE F     490 = 640C B    740 = ED0F 2    990 = F2EC 5   1240 = 2B9E 2   1490 = EB78 F   1740 =  4A4 5   1990 = 87F2 4   2200 = 9FF7 9   2410 = ED0F 8
 250 = FD2E 7     500 = EAD3 7    750 = 9719 E   1000 = AFF2 3   1250 = ED0F 7   1500 = 15CA 7   1750 = 2C83 A   2000 =  15F B   2210 = ED0F E
```

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Archimedes A420/1 base.....£1125
Archimedes A440/1 base.....£1475
Archimedes A540/1 base.....£2550

Archimedes Colour Monitor.....£195

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Amstrad 464plus + Colour Monitor ..£305
Amstrad 6128plus + Mono Monitor..£305
Amstrad 6128plus + Colour Monitor £395

PLEASE NOTE
Games Machines above are quoted inclusive of VAT

Phone for Concept Keyboards, PRES Units, TV Modulators, etc.

Phone for prices on:
Amstrad, Canon, Commodore, HP, Olivetti, Opus, Philips, Schneider, Tandon, Toshiba, Zenith
AMSTRAD FACSIMILE MACHINES.
Or any other product not listed

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Crystalprint Super Series II £1250
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(HP Laserjet II & POSTSCRIPT)

Crystalprint Express £3500
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LQ400.....£215
LQ550.....£299
LQ850.....£495
LQ1050.....£655
LQ2550.....£800
SQ2550.....£750

EPL7100 LASER £850

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All prices exclude VAT and are available for a limited period and are subject to availability.
Government and Educational Orders Welcome.

Exciting output

No, it's not Hac Man, just Geoff Brown investigating a unique printing system

POSTSCRIPT is a strange phenomenon in the computer world. Most people have come across phrases like PostScript printers, PostScript-compatible, PostScript printer driver and so on. But what is it?

Essentially it's just a computer language, a bit like Forth in style, but it has a specific purpose – to describe the text and graphics on a page.

It incorporates lots of standard commands for specifying fonts, drawing lines, rotating objects previously described and so on.

A PostScript printer is sent a computer program which, when executed, will result in a specific page layout.

The Postscript printer driver for the Archimedes translates the various printing instructions into PostScript commands which it relays to the printer.

What the package ShowPage does is take a PostScript file, which could have been created by printing to disc either on an Archimedes or a completely different computer (perhaps an Apple Mac), and either displays each page in a window or prints it to the current printer driver.

When printing, ShowPage is effectively translating from PostScript to whatever printer type you happen to have. Computer Concepts are eager to point out that printing a PostScript file through ShowPage via their LaserDirect printer is much quicker than using a PostScript printer – and a lot cheaper.

One interesting point is that the popular Illustrator 3 software on the Apple Macintosh actually uses PostScript as its file format and these can also be loaded directly into ShowPage. The Hac Man logo here is an example.

Product: ShowPage
Price: £71.35
Supplier: Computer Concepts Ltd., Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX.
Tel: 0442 63933

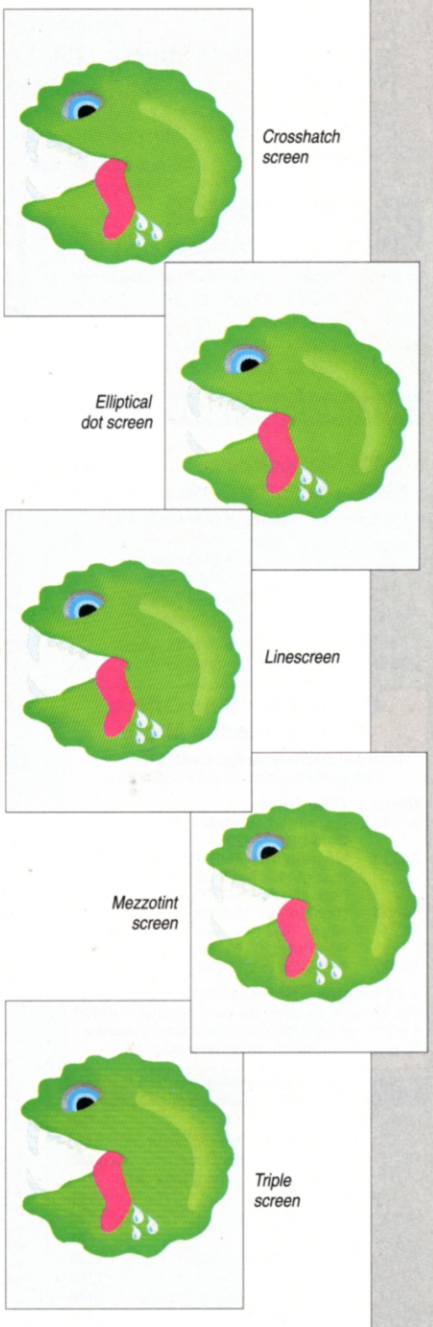
The package consists of the disc of software, some new fonts and examples, a short manual and two books – The PostScript Tutorial manual and the PostScript Reference manual, both by Adobe and referred to as the red and the blue books.

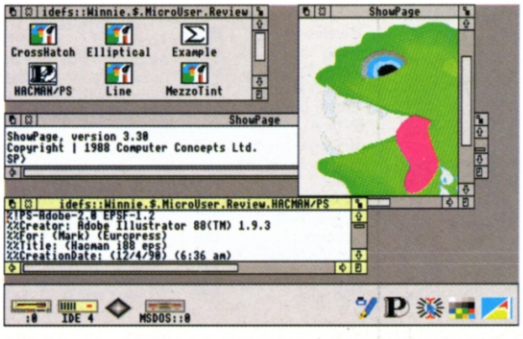
When running there are two windows. One contains a view of the page that's been created and the other contains a running commentary of what the program is doing and also allows you to type in PostScript commands directly.

The display window menu options allow you a great deal of control of the output image.

One of the crucial points when printing for commercial purposes is that of *screens*. These are used to set the size and density of the dots that go to make up pictures – you can see this sort of thing most clearly in newspaper pictures.

However, screens can also be used to produce all sorts of special effects and the different versions of Hac Man here were produced with a variety of techniques.





AShowPage at work

Summing up

In many ways ShowPage is a highly specialised piece of software that most people will have no use for, and the high price reflects this.

But if you need to print PostScript files, the combination of ShowPage, LaserDirect – or another direct print system – can result in a complete PostScript printing system at less than £1,500, which is very reasonable indeed.

Watford Electronics

(A member of the Jessa group of Companies – Established 1972)

Jessa House, 250 Lower High Street, Watford WD1 2AN, England
Tel: Watford (0923) 37774 Tlx: 8956095 Fax: (0923) 33642

The choice of Experience

Shop Hours: 9am to 6pm (Mon.-Sat.) Thursday 9am to 8pm. FREE customer car park.
All prices exclusive of VAT; subject to change without notice & available on request.

The sign of Quality

Archimedes micro

System	Basic	Mono	Colour	Multiscan
410/1	£1099	£1159	£1259	£1448
420/1	£1299	£1359	£1459	£1648
440/1	£1699	£1759	£1859	£2048
540/1	£2995	£3065	£3155	

Archimedes A3000

12 MONTHS FREE MAINTENANCE ON SITE

- A3000 Microcomputer **£599**
- A3000 + Learning Curve pack **£699**
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- Technical Manual **£60**
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- Dust Cover for Micro + Monitor **£9**
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Unbeatable Sale Offers on Archimedes Micro

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, (A420)
A420/1	Upgraded to 4MB RAM 40MB Hard Disc (A440), MK II Learning Curve pack and Acorn DTP pack
A440/1	High Res 14" Multiscan Colour Monitor
540/1	High Res Multiscan Monitor & Panasonic KX-P1180 Printer
A3000	Upgraded to 2 Megabyte of RAM

+ 12 months FREE On-Site Maintenance
(P.S. Instead of the above Hardware upgrades on A410/1 & A420/1, we will fit the 30MHz Turbo Board if required. Please specify your requirement when ordering.)

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- MIDI Expansion Card **£65**
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- Sound Sampler Stereo /Midi (Armadillo) **£186**
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- Archimedes IEEE Interface Adaptor **£269**
- Dual RS232 Podule **£195**
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- PC Emulator NEW Faster Version **£62**
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- 4 Podule Backplane **£38**
- Fan for above backplanes **£8**
- Risc Os Extras Software Disc **£5**
- Smoked Perspex Low profile Keyboard Cover **£8**
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CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

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- **R810** – A410/1 upgraded to 8MB **£910**
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Increase the speed of your Archimedes by a factor of THREE to SIX times (depending on the software you are running), with Watford's ARM3 Upgrades.

- **ARM-3** 20MHz Upgrade Board **£325**
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(ARM 3 price includes a FREE Chip extraction tool)
(Special Offer – If purchased together with an Archimedes Micro, then not only will we fit the card Free of Charge but we will also reduce the price by £40 i.e. You pay only £285 for ARM3 20MHZ & £335 for ARM3-30MHz)

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required. Fitting instructions supplied.

- **R302**-A3000 – to 2MB RAM Upgrade **£56**
- **R304**-A3000 – to 4MB RAM Upgrade **£169**
- **R311**-A305 – to 1MB RAM Upgrade **£50**
- **R312**-A305/310 – to 2MB RAM Upgrade **£245**
- **R314**-A305/310 – to 4MB RAM Upgrade **£435**
- **R412**-A410/1 – to 2MB RAM Upgrade **£39**
- **R413**-A420/1 – to 4MB RAM Upgrade **£75**
- **R414**-A410/1 – to 4MB RAM Upgrade **£105**

Archimedes Hard Disc

Watford's ST506 Hard disc drives for A310 & A410 series fit internally into the space provided. The 'simple to follow' fitting instructions supplied makes drive fitting very easy. All disc drives are auto parking. 40Meg & 53Meg drives are fast 24mS type, while 20MHz are 28mS.
P.S. A310 upgrades require a backplane and a fan.

- **3HDP** – Hard Disc Podule only **£135**
- **3HD20** – 20Meg H' Disc + Podule for 310 **£289**
- **3HD40** – 40Meg H' Disc + Podule for 310 **£389**
- **3HD50** – 53Meg H' Disc + Podule for 310 **£474**
- **4HD20** – 20Meg Hard Disc for 410 **£165**
- **4HD40** – 40Meg Hard Disc for 410 **£245**
- **4HD50** – 53Meg Hard Disc for 410 **£335**
- A3000 20Meg Hard Disc + Podule **£359**
- A3000 40Meg Hard Disc + Podule **£489**

Convert your Archi 410 to a 420 or 440 with Watford's unique Upgrade Kits

- **UP10** – to 2MB RAM + 20MB Hard Disc **£210**
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- **UP20** – to 4MB RAM + 20MB Hard Disc **£265**
- **UP30** – to 4MB RAM + 40MB Hard Disc **£345**
- **UP40** – to 4MB RAM + 53MB Hard Disc **£475**

Silicon Vision

Gerber Plot	£95	Super Dump	£22
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Kermit	£46	Real McCoy	£22
Mogul	£19	Redshift	£14
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		Superior Golf	£15
		Talisman	£12
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Break 147	£20	White Magic	£15
Bug Hunter	£14	White Magic 2	£15
Caverns	£14	Wimp Game	£15
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ISO-PASCAL; FORTRAN 77			£77 each
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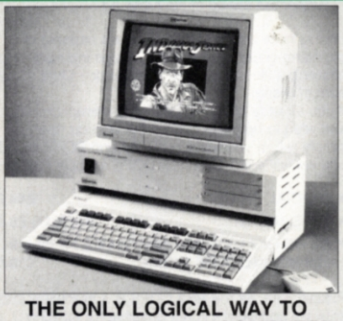
** Requires System Delta*

NEW Business Accounts Packages
Nominal Ledger, Order Processing/Invoicing, Purchase Ledger, Sales Ledger & Stock Control
Price: **£78** per Module or
£299 for complete package

ULTIMUM – Archimedes A3000 Podule Racking System



THE ONLY LOGICAL WAY TO EXPAND YOUR A3000 COMPUTER

The accepted standard for Archimedes computer expansion is the Acorn Podule, designed initially to fit the old 310, and also for the later A400 and A400/1 series micros. The podules fit inside these computers up to four at a time. The A3000 is the little brother of the family, but can only have one podule at a time, plugging into the back of the computer.

Other attempts have been made to expand the A3000 by trying to introduce a 'mini-podule'. This is impractical for many reasons, amongst which is the reluctance of manufacturers to produce them. Nobody wants to re-design podules already produced. Some cannot be produced on a 'mini-podule' as they are far too complicated and simply wouldn't fit.

Watford Electronics listens to the demands and requirements of its customers, and we are glad to say that we have come up with the only real solution to the A3000 expansion problem. The ULTIMUM Podule Racking System allows up to three FULL SIZE standard Archimedes 300/400 series podules to be fitted to the computer. In addition, there is also provision for a hard disc drive and a podule to be fitted internally.

Since the ULTIMUM Podule Racking System takes proper full size podules, you will be able to use any of the currently available peripheral equipment, from companies like Computer Concepts, Armadillo, Acorn and of course, our own brand.

Fitting the podules to 'ULTIMUM' is simple. They are neatly fitted inside the metal case of the rack, avoiding the previously untidy method of hanging the podule off the back of the computer, risking damage to both, it and to the computer.

'ULTIMUM' has its own power supply, so no strain is put on the A3000 power supply. There is also an IEC mains output socket for an Acorn type monitor so reducing the number of plugs required to go to the mains. The ULTIMUM is rigidly clamped over the top and under the computer, and allows direct access to the floppy disc drive and reset button, rather than obstructing access as on other systems. One can also place a standard monochrome or 14" colour monitor (even a multiscan type) safely on top. The mounting method employed is so firm that the computer could even be safely transported without the assembly falling apart.

Price: £125

Archimedes A300/A400 SCSI Hard Disc Offer
(while stocks last)

100MB Hard Disc Upgrade complete with Controller card, Cables, Formatter and Manuals

RRP: £1030
Offer Price: £499

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.
New RISC OS Version **Only £15**

Archimedes External Disc Drive Interface

With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. Fully Buffered Board. NO SOLDERING is involved. Supplied complete with necessary lead.
- A300/A3000 **£21**
- A400 **£25**

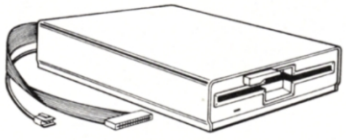
Special Education Prices

All education establishments qualify for special education prices on micros, etc. Please write in or telephone (0923) 37774 or 50335 for written quotation.

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£399** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.

FREE with every BBC Master purchased from us during April

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Quad ROM Cartridge for Master			£14
Master Reference Manual I		(No VAT)	£14
Master Reference Manual II		(No VAT)	£14
Master Advance Ref Manual		(No VAT)	£17
64K Upgrade Kit for B+			£32
Acorn 1772 DFS Kit complete			£49
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Morley Teletext Adaptor with ATS Rom			£99
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Filestore E60S	£949	Ecolink	£270

(Carr. £2 to £7 depending on the weight)

0% Finance Now Available

On Acorn Archimedes A3000 and A420/1 with learning curve packs. (Please telephone for details)

Watford's Scottish Dealer

We are pleased to announce the appointment of Messrs Computer Depot as Watford's official Scottish Dealer. The full range of our BBC/Acorn products is now available from their Dundee, Edinburgh & Glasgow shops. Their technical staff will be very happy to discuss all your peripherals' requirements.

Commander Joystick

Watford Electronics' new Commander Joystick for the BBC B and Master 128K has a unique dual mode of operation giving selective free floating or self centring fully variable control in both X and Y axis directions. Commander is particularly good for flight simulation and drawing programs.

Features:
- Direct connection to BBC Analogue input port – no interface needed.
- Fully compatible with all BBC Joystick controlled games programmes.
- Switchable springs allow selection of floating or centring operation.
- Trim adjusters for both X and Y axes for fine centre adjustment.
- Convenient stick mounted fire button with additional base buttons.

Launch Price: £15

Quest Mouse Mk3

The latest Quest Mouse from Watford features an attractively designed and ergonomically formed three button mouse, with a very positive feel. It is extremely comfortable to use in the palm of ones hand. Mk 3 mouse is available for the BBC B and Master 128K. It is fully compatible with AMX and Quest softwares.
- Quest Mouse MkIII for BBC Micro **£30**
- Quest Mouse + Quest Paint **£59**

Archi Mouse Port Splitter

Continuous plugging and unplugging of the mouse is not only inconvenient but can also damage your micro. Our handy little Archi mouse port splitter unit eliminates this risk by allowing you to connect a mouse and a joystick or a tracer ball simultaneously to your Archimedes micro. The miniature slide switch on the box enables you to select the socket to be used. **£15**

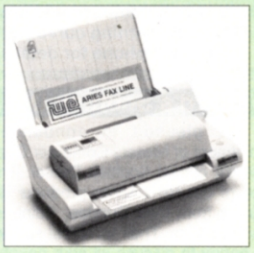
Archimedes Education Software

- Advanced Folio: 7-14 years. Has the simplicity of a basic wordprocessor with the presentation quality of a Desk Top Publisher **£38**
- Colourcopter & Numbercopter: 4-7 years. Flying start in pre-reading and pre-number skills
- Colourcopter includes 7 programs to develop matching, sorting, coordination, letter & word recognition **£28**
- Numbercopter: Includes 8 programs to develop memory, sequencing, logic, number, more and gone away, word order and rhythm skills **£28**
- Concept Keyboard Podd 5-11 years: This concept keyboard version of Podd encourages less able and young children to join in the fun of discovering the 116 actions which podd can perform. Simple to operate **£23**
- Best Four languages 5-11 years: Four best selling programs which encourage children to work together to improve their linguistic ability **£33**
- Hands on Spelling 5-11 years: Promotes a visual approach to mastering spelling, linking the skill with other National Curriculum areas as hand writing, talking and reading. **£30**
- An Eye for Spelling 7-14 years: Manages and motivates children, learning to spell with individual attention. It uses Charles Cripps' visual approach to help reluctant spellers by encouraging them to look at the internal structure of words. **£24**

(More Educational software on page 10)

Continued→ → → → → → → → →

Archi A4 Scanner



This new A4 image scanner from Watford Electronics is supplied complete with ROM based podule software. Features provided include facilities for zooming in on an image and inverting the image in X and Y directions, saving and printing of the sprite created. Interactive help is supplied using the !HELP application on the Acorn applications discs.
The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, diagrams, etc., with its fast ten page automatic document feeder, but it can also detach from the feeder to become a convenient hand-held full page scanner for larger documents or pictures.
Scanned image control can be freely adjusted in increments of 10 dots per inch from 100 up to 400 dpi resolution with 64 levels of grey scaling. A built in shading controller and manual brightness control achieve optimum image clarity.
Unlike some scanners, which use a red light source, the Watford scanner uses a yellow/green source which vastly improves the light/dark contrast, thus eliminating the effect where any red-based colours are faded down to white and so do not show up in the scanned image.
All these features and facilities combine to make the Archi Page Scanner the fast and convenient way in which to add that extra impact, interest and clarity to documents, reports, instruction sheets, manuals, news letters, etc., from your Archimedes DTP package.

Introductory Prices:

Archi A4 Scanner	£349
Sheet Feeder for above	£95
Scanner + Sheet Feeder	£419

Z88 Portable Micro

£189

FREE

With every Z88 purchased from us, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

Z88 ACCESSORIES

- 32K RAM Pack or 32K EPROM Pack £18.00
- 128K RAM Pack or 128K EPROM Pack £42
- 512K RAM Pack £175
- Z88 Eprom Eraser Unit £33
- Z88 Spellmaster for Pipedream £51
- Z88 Carrying Case £8
- Z88 Computing Book £9.95
- AA Nicad Rechargeable Battery £1.50
- Battery Charger Compact & Fast £6
- Z88 Serial Printer Cable £8
- Z88 Parallel Printer Cable £25
- Z88 to Archi Link £15
- Z88 to BBC Link £20
- Z88 to PC Link II £30
- Z88 to Macintosh £52
- Z88 Mains Adaptor £9
- Z BASE £56
- Z TAPE £42
- Z TERM £42
- Z88 Modem £149

Archi Real-Time Digitiser

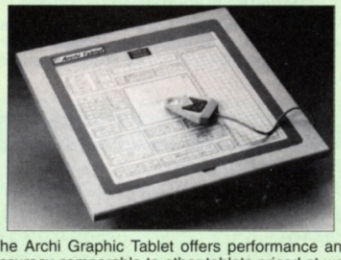
Now supplied with NEW RISC OS Version Software

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £175

A Set of Colour Filters for colour image grabbing using a video camera	£16
New Risc-OS Software Upgrade	£39

Archi Graphic Tablet



The Archi Graphic Tablet offers performance and accuracy comparable to other tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely. The package is supplied complete with sophisticated Archi software. (Now, fully LinCAD compatible. Recommended by Linear Graphic for use in Education).
(FREE this month, PC Mouse Drivers & Art package)

Special Price £199

(Price includes Tablet, Leads, Software & Puck)
Stylus Optional Extra **£15**
Archi Graphic Tablet Junior. Working area 9" x 6". Price includes Stylus **£125**

Disc Plonker Rack

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk. Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: **£2**

Acorn & Watford DFSs

- Watford sophisticated DFS ROM £16.00
- Watford DFS Kit complete £69.00
- We will exchange your existing ROM for Watford's ultimate DFS ROM at only £12.00
- DFS Manual (comprehensive) £6.95
- Acorn DNFS ROM £17.00
- Acorn ADFS ROM only £25.00
- Acorn 1772 DFS ROM Kit £49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1772

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.
Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£39.00.**

- SPECIAL PRICE **£44.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£30.00**

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

3M – Diskettes

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

- *10 x 5.25" S/S D/D 40T (744)* **£5**
- *10 x 5.25" D/S D/D 40T (745)* **£5**
- *10 x 5.25" S/S D/D 80 Track (746)* **£7**
- *10 x 5.25" D/S D/D 80 Track (747)* **£7**
- *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT* **£11**
- *10 x 3.5" S/S D/D 40/80 Track* **£7**
- *10 x 3.5" D/S D/D 40/80 Track* **£8**
- *10 x 3.5" Double Sided High Density* **£15**

Top Quality 3.5" & 5.25" Diskettes

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 x **M3** 3.5" D/S D/D 80 Track* **£7**
- *10 x **M9** 3.5" D/S High Density* **£12**
- *10 x **M4** 5.25" S/S D/D 40 Track* **£5**
- *10 x **M5** 5.25" D/S D/D 40 Track* **£5**
- *10 x **M7** 5.25" D/S D/D 80 Track* **£7**
- *10 x **M8** 5.25" D/S H/D Hi-Density* **£12**
- ***M2** 3" Double Sided* **£2.50** *each*

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Quality Disc Drives from Watford

All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. All 5.25" Disc Drives are 40/80 track switchable. For ease of use, the switches are front mounted. Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

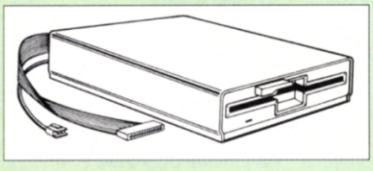
If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, are the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

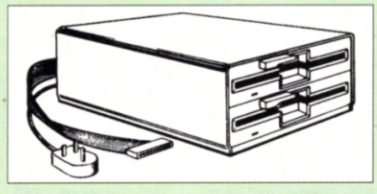
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.***

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 6th page of our advert for the Plinths).

P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is our special Compact Disc Drive cables designed by us.

"Test Bureau Approved for Use in Education"





Our Disc Drives conform to BS415

Type	Description	
	Disc Drive without PSU	
• **CLS400S:**	Single, 40/80 track 400K Double sided Drive	**£72**
• **CLD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£142**
	Disc Drive with PSU	
• **CS400S:**	Single, 40/80 track, 400K Double sided Drive	**£82**
• **CD800S:**	Twin, 40/80 track, 800K Double sided Drives	**£155**

Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

Disc Drive/DDFS Offer

- The popular CLS400S 40/80 track switchable disc drive.
- Watford's popular Mk II DDFS Interface (allows up to 720K storage). Will run both in single & double density modes.
- A comprehensive DFS Operating manual

Bargain at Only **£119** (Offer valid until stocks last)

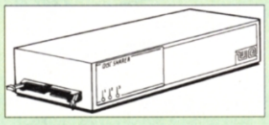
3.5" DISC DRIVE

These top quality 3.5" Double sided, 80 track, are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

Type	Description	
	Disc Drive without PSU	
• **CLS35:**	Single Disc Drive, 400K	**£62**
• **CLD400S:**	Twin Disc Drives, 800K	**£109**
	Disc Drive with PSU	
• **CS35:**	Single Disc Drive, 400K	**£83**
• **CD35:**	Twin Disc Drives, 800K	**£126**

(P.S. CS35 is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage)

Disc Drive Sharer



(Ideal for educational establishments)

A low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Price includes 3 Cables **£55**

Disc Drives in Monitor Stand

• **CDPM 800S** – Twin 5.25", 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC B & Master 128K micros. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

£165

• **DP35 800** – Same as above except, one disc drive is a 5.25" and the other is 3.5".

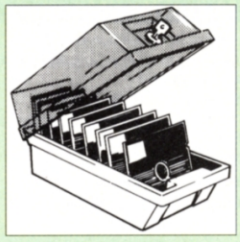
£154

Floppy Head Cleaner Kit

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

Antistatic Lockable Disc Storage Units

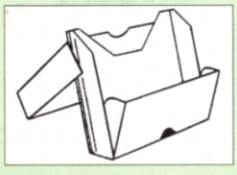


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** – holds up to 50 5.25" discs **£4.95**
- **M85** – holds up to 95 5.25" discs **£6.95**
- **M25*** – holds up to 25 3.5" discs **£4.95**
- **M50** – holds 50 3.5" discs **£6.50**
- **M10** – holds 8 of No. 10 Data Cartridges **£15**

* Not lockable

Plastic Library Cases



Holds up to 10 x 3.5" Discs. **£1.50**
Holds up to 10 x 5.25" Discs. **£2.00**

Dust Covers (For our Disc Drives)

Single CLS (without PSU) **£3.20**
Single CS (with PSU) **£3.25**
Twin CLD (without PSU) **£3.85**
Twin CD (with PSU) **£3.90**

Disc Albums

Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

£4

Special Bulk Offer on Discs

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
• Without Sleeves 5.25"	£30	£35	£40
• With Sleeves 5.25"	£33	£38	£43
• 3.5" D/S D/D	£29 for 50	£52 for 100	

Continued→ → → → → → → → →

12 months FREE maintenance on site

Microvitec Monitors

- **1431** – Standard Resolution Monitor £172
- **1451** – Medium resolution, suitable for word processing in mode 0 £215
- **Cub3000** Medium Res for A3000 £195
- **1441** – High res, exceeds the capabilities of the BBC Micro £359
- **2040 CS** 20" Hi Res £675
- Dust Cover for Microvitecs £5.50
- **Touchtec 501 Touch Screen** £239

Multiscan Colour

• Eizo 9060S	£389	• NEC 4D	£685
• Eizo 9070S	£579	• Taxan 770LR	£383
• Panasonic	£325	• Taxan 775	£383
• NEC 2A	£289	• Taxan 795-PC	£430
• NEC 3D	£358	• Taxan 875	£565

• VIDC Enhancer Board £25

(P.S. Taxan 795 monitor is supplied with a FREE VIDC enhancer board)

Philips

- **BM7502** 12" Hi-res Green Monitor £70
- **CM8833** 14" Med. Res Colour Monitor £173

STAR BUY

- **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor . A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £159

Dust Cover for Philips Monitors £6
(Securicor carriage on Monitors £7)

Spare Monitor Leads

BNC Lead for Zenith or Philips	£3
Skart Monitor Lead	£5
RGB lead for TAXAN Monitors	£3
Archimedes Colour Monitor Lead	£7.50

Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

£12

Canon Bubblejet Printers

Type	Printer	CS Feed	Ink Cart
BJ10E	£222	£54	£18
BJ300	£375	£88	£12
BJ330	£445	£110	£12

NEC Pinwriter Printers

• P30	£257	• P60	£379
• P70	£485	• P90	£655

Be Satisfied Before You Buy

We have on display, various Micros, Printers, Disc Drives, Monitors, etc. Call in at our showroom to evaluate before you buy.

Concept Keyboards

Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117
Archi A3 Keyboard	£144
Archi A4 Keyboard	£118

FREE On-Site Maintenance

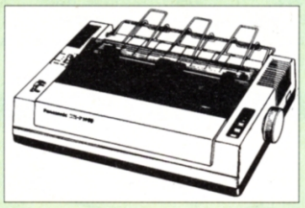
This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Microvitec and Multiscan colour monitors, all Panasonic printers, and all Laser Printers, Roland Plotters and of course the full range of Archimedes micros. Should the machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours. (Offer applicable only when bought at prices advertised in this advert. UK mainland only).

Hewlett-Packard Printers

• Desk Jet 500	£368	• Paintjet XL	£1155
• Desk Writer (Mac)	£482	• Quiet Jet Plus	£376
• Desk Jet Cartridge	£15	• HP Think Jet	£240
• Paint Jet Colour	£625	• Rugged Writer	£849

- Paintjet Cartridges Black **£19;** Colour £25
- Desk Jet 500 256K RAM cartridge £129
- HP Epson FX Emulation Cartridge for Desk Jet £59
- HP Apple Talk Interfaces for
- Scan Jet £299 • Paint Jet £POA
- Desk Jet Unlimited (Book No VAT) £19.75

Panasonic Printers



FREE with every **KX-P1081 & KX-P1180** Printers: A printer lead (please specify type required) and a Dump Out 3 ROM for the BBC Micro or 1,000 sheets of paper for other micros (please specify)

- **KX-P1081** 9pin 80col. 144/28 cps £122
- **KX-P1180** 9pin 80col. 192/38 cps £129
- **KX-P1123** 24pin 80col. 192/63 CPS £165
- **KX-P1124i** 24pin 80col. 192/63 CPS £224
- **KX-P1624** 24pin 132col. 192/63 CPS £299
- **KX-P1695** 9pin 132col. 330/86 CPS £299
- **KX-P1654** 24pin 132col. £439

Above prices include FREE, Watford's 12 months on-site maintenance

Panasonic Accessories

Cut Sheet Feeders

KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
KX-1124 (P36)	£85	KX-P1180 (P37)	£79
KX-P1624/1695 (P38)	£124	KX-P1123 (P37)	£79

Buffers

P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
P43	32K Buffer Chip for 1540/1124/1180	£16

Serial Interfaces

P17 P1081/1592 £32 **P19** P1124/1180 £55

Citizen Printers

120D Plus	£99	124D Printer	£165
Prodot 9	£239	Prodot 24	£339
Swift 9	£149	Swift 24#	£216

- Prodot Cut Sheet Feeder £120
- Swift 24 Colour Option £32
- Swift 24 Ribbons Black £4 Colour £13

Special Offer this month – A FREE Colour option cartridge with every Swift 24 printer purchased from us.

Star Printers

- **LC10** 9pin 80col. 144/36 CPS £117
- **LC15** 9pin 136col. 180/45 CPS £195
- **LC24-10** 24pin 80col. 180/60 CPS £163
- **LC24-15** 24pin 136col. 200/67 CPS £305
- ***FR10** 9pin 300/76 CPS 31K 16 fonts £259
- **FR15** Wide carriage version of above £319
- ***XB24-10** 24pin 80col. 240/80 CPS £319
- **XB24-15** 24pin 80col. 240/80 CPS £389
- **XB-24** Colour Kit £35
- **LC-200** Colour 9pin 80col. 180/45 CPS £160
- **LC-24-200** 24pin 80col. 222/67 CPS £195
- **LC24-200** Colour 24pin 80col. 222/67 CPS £230

*FREE Colour Ribbon with these printers

Star Accessories

Cut Sheet Feeder

LC10/200/24-10	£65	LC15/LC24-15	£125
XB24-10	£80	XB24-15	£139

Serial Interfaces

SPC-10 LC10; LC10-II; LC10-Col; LC15; LC24-10; LC24-15; LC-200; LC24-200 £49

8K Ser LC-200; LC24-200; FR10; FR15; XB24-10; XB24-15 £64

Paper Roll Holders

LC-200; LC24-200; LC24-200 colour £29

Buffers

32K Ram Card for LC24-10; 15 & 200 £55
32K Ram Card for XB24-10 & 15 £55

Ribbons

LC10; LC10-II; LC15	Black **£4;**	Colour £6
LC-200; LC24-200	Black **£5;**	Colour £12
XB24-10; XB24-15	Black **£5;**	Colour £12

Laser Printers

• Canon LBP-4	4ppm	£690
• Canon LBP-8 IIIR	8ppm	£1535
• Canon LBP-8 IIIT	8ppm	£1410
• Epson EPL7100	6ppm	£720
• HP Laserjet III	8ppm	£1035
• HP Laserjet IIID	8ppm	£1539
• Panasonic KX-P4420	8ppm*	£659
• Panasonic KX-P4450i*	11ppm*	£1075
• Panasonic KX-4455 Postscript	11ppm*	£1699
• Qume Crystal Print Publisher 2		£1899
• Star LP-8 III		£985
• Star LP-8 Star(post)script		£1215
• Star LP-4 4ppm		£735
• Star LP-4PS Postscript 4ppm		£927

* Now 2 years warranty

Laser Toners

Canon 2 & 4	£54	Laserjet II & IIP	£55
Epson GQ	£18	Laserjet III	£75
Star LP-8	£69	Qume Crystal	£56
KX-P4420/50	£22		

Laser RAM Upgrades

• IIP & III 1MB	£79	• EPL7000 2M	£365
• IIP & III 2MB	£125	• GQ5000 512K	£95
• II & IID 1MB	£80	• KX4420/50 1M	£158
• II & IID 2MB	£127	• KX4420/50 2M	£220
• II & IID 4MB	£299	• KX4420/50 4M	£349
• Canon LBP4 1M	£175	• Star LP8 1M	£143
• Canon LBP8 2M	£150	• Star LP8 2M	£285

Laser Drum & Developer

• Epson Drum GQ5000	£93	EPL7100	£129
• Panasonic 4420 Drum	£60	Developer	£59
• Panasonic 4450 Drum	£93	Developer	£80
• Qume Drum	£76	Developer	£56

Jetpage Postscript Cartridge

• HP IIP/III £255 IID & IIID £265

NEW – HP Laserjet

Various Font Cartridges £45
Superset Font £195

Integrex Colour Jet

- Colour Jet 132 Printer £515
- Paper Roll £6.50
- BBC Screen Dump Software £10
- Colour Cartridge £19.50
- Black Cartridge £11.25
- Black Textile Cartridge £17
- 100 A4 OHP transparencies £55
- 8K Serial Interface Optional £123

Special Offers this month

Canon BJ 10E Printer	£219
HP Deskjet 500 Printer	£349
Panasonic KX-P1123 Printer	£162
Panasonic KX-P1124 Printer	£180
Panasonic KX-P1592	£199
TAXAN 795 Trinitron	£435

Epson Printers

DFX5000	£1105	LQ860 Colour	£489
DFX8000	£2070	LQ1050+	£520
EX1000	£535	LQ1060	£606
FX850	£294	LQ2550+	£729
FX1050	£368	LX400	£116
FX1060	£599	LX850	£179
LQ400	£178	SQ850	£459
LQ550	£246	SQ2550	£719
LQ850+	£425		

Cut Sheet Feeders for

LX400/800/850/LQ400/500/550 **£69**
EX800/FX800/850/LQ800/850 **£130**
FX/LQ 1000/1050/SQ850 **£159**
LQ 2550 **£390** SQ2550 **£390**

Tractor Feed for

LQ800 **£44;** LQ850/FX850 **£69;** LQ1050/FX1050 **£85;** LQ2500 **£90;** LQ2550 **£90.**

Accessories

- EX800/1000 Colour Option £45
- EX800/1000 Colour Ribbon £14
- LQ2500 Colour Option £65
- Multifont Card for LQ550/850/1050 £95

Epson Printer Interfaces

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£95	RS232 + 8K Buffer	£75

Printer Leads

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 6'	£6
Nimbus Centronics Lead	£6
IBM/Archimedes Parallel Lead 6'	£6
IBM/Archimedes Parallel Lead 5 metres	£13
IBM/Archimedes Parallel Lead 10 metres	£19
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.
IBM Keyboard extension lead coiled	£5

Plotters

HP Plotters

HP7440	£425	HP7475	£615

Roland Plotters

DXY1100	£515	DXY1200	£655
DXY1300	£865	DXY2500	£2375
DPX3500	£3385	Sketchmate	£380

Roland plotter Pens, Fibre tip **£7.50**

Roland SketchMate

The Intelligent Graphic Plotter

The SketchMate offers the same high performance and versatile function of larger, more expensive plotting systems, but at an affordable price. It is very compact and lightweight. In restricted space, it can be operated in a tilted position. Is compatible with virtually all CAD software as well as a wide range of business softwares. The 'ArtMate' software package supplied, is designed to be used with IBM PC/AT systems.

Specifications: Plotting area: 297 x 216mm. Number of Pens – 8. Magnetic Paper holder. 5K Buffer. Parallel and RS 232 Serial interfaces. Accessories: 8 pens, AC Adaptor, 4 x Magnetic paper holders, User manual, marking sticker, Rubber sticker, 10 x A4 test paper, 2 x A4 OHP transparency film. Dimensions: 360(W) x 410(D) x 105(H)mm. Weight 2.6 Kgs.

Launch Offer: £380

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold Paper £7
- 2,000 Sheets 9.5" x 11" Fanfold Paper £11
- 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold £21
- 1,000 Sheets 15" x 11" Fanfold Paper £9
- 2,000 Sheets 15" x 11" Fanfold Paper £16
- 1,000 Sheets true A4 Fanfold Paper 70gms £11
- 2,000 Sheets true A4 Fanfold Paper 70gms £21
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£6.00
1,000 90 x 36mm (Twin Row)	£6.25
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.75

Special Offer

Hitachi/Acorn 12" High Resolution, ergonomically designed Colour Monitors. Supplied complete with a swivel base and a BBC lead.

Only: £139 (While stocks last)

Printer Ribbons & Various Dust Covers

Type	Ribbons	Dust Covers
Brother HR15/20	£6.00	–
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Citizen 120D	£2.75	£4.50
DMP2000	£2.75	£4.75
EX800/1000	£3.50	£5.00
RX/FX80/85/800/MX80	£2.95	–
FX/MX/RX100/1000	£3.95	–
Kaga/Taxan KP810/815	£3.25	£5.00
LQ400/500/550/800/850	£3.25	£6.00
LQ1050/LQ2500	£4.00	–
LX80/86/800/850	£2.75	£4.50
LX400	£3.50	£5.00
M1009/GLP	£2.95	£3.75
NEC P2200	£4.50	£5.00
Panasonic KX1080/81	£3.25	£4.75
Panasonic KX-P1124	£7.50	£5.00
SQ2500	£23.00	£5.50
Star LC10/NL10	£2.75	£5.00
Star LC24-10	£2.95	£6.00
Olivetti Ink Jet Cartridges (set of 4)	£9	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Original Panasonic Ribbons

Guaranteed to last 3 million characters

P110 for KX-P1081, 1592 & 1595	£7
P115 for KX-P1180/P1624	£7
P145 for KX-P1124	£8
P140 for KX-P1540	£10
Colour Ribbons for KX-P1081, 1592 & 1595 Brown, Blue or Red	£9.95 each

Professional Printer Stand

The professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer func-tions is effectively halved. Its ergon-omic design ensures smooth paper flow and automatic refolding.

80 Column version £24 (carr. £3)
132 Column version £29(carr. £4)

Universal Printer Sharers/Changer

Connect up to 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	Serial	Centronics
2 to 1	£16	£17
3 to 1	£22	£24
5 to 1	£36	£32

(Cables extra at £6 each. Please specify type required when ordering)

2 Way Compact Printer Switch

A handy 2 way printer switch. Enables one micro to be connected to 2 printers or vice versa.

Centronics **£18;** Serial **£17**

(Cables extra at £6 each)

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£36	£39
4 to 1	£59	£55
8 to 1	–	£85

256k Multi Spooler

These Auto Centronics Printer Sharers have built-in 256K of Printer Buffers. They can be used as Auto Sharers, Printer Buffers or both.

- 2 In/2 out **£135**
- 4 In/2 out **£169**
- 8 In/1 out **£199**

Compact Converter Units

Serial to Parallel **£36** Parallel to Serial **£37**

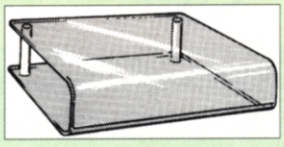
Plinths for the BBC B & Master 128K Micros

Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. Colour: Matching BBC Beige.

Single BBC Plinth	420 x 310 x 105mm **£13**
Double BBC Plinth	420 x 310 x 210mm **£24**
Single Master Plinth	490 x 310 x 105mm **£14**
Double Master Plinth	490 x 310 x 210mm **£26**

(Carr. Single plinth £2; double plinth £3)

Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version **£16** (carr £3)
136 Column version **£20** (carr £4)

Continued→ → → → → → → → → →

QUEST MOUSE Mk II

- Quest Mouse II & Quest Paint **£58**
- Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont **£89**
- Quest Mouse II only **£29**
- Quest Paint Software only **£34**
- Quest Font Disc (22 Text Fonts) **£15**
- Quest Mouse Mat (Red or Blue or Green please specify) **£3**
- Quest Colour Dump Disc – This new software allows you to print direct from Quest Paint to your Integrex Colour Printer **£18**

  (P.S. Quest Paint is not compatible with BBC Compact)

Quest Paint is the winner of the BBC Acorn User 1990 Award for the Best Art/Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

ConQuest ROM Package **£30**
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro **£32**

QUEST – Tracer ball

An attractively finished, extremely reliable, mouse replacement, input device. Requires very little desk space. Connects directly to your BBC B, BBC Master or Archimedes Micro.

QT-10 BBC/Master Version **£27**
QT-20 Archimedes Version **£30**

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£46

THE NEW Mk III AMX MOUSE

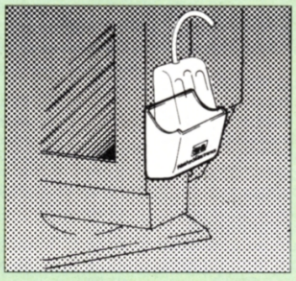
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

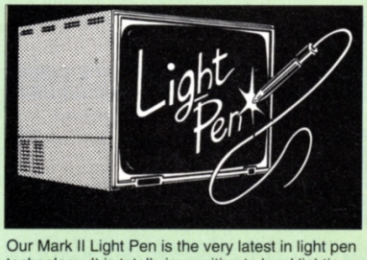
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE Mouse House



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk.
It protects it from damage when not in use, yet within easy reach when you need it again. At £4 it does not cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use in Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro. This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket. The software supplied includes a sophisticated, fast screen dump routine.
Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

The Beeb HandScan

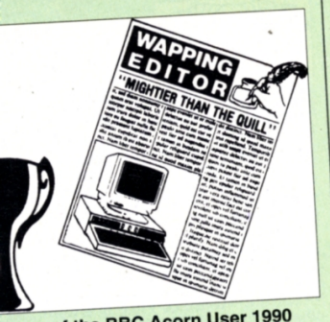
Hand-held Scanner for the BBC Micro

Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware **£135**



Winner of the BBC Acorn User 1990 Award for the Best DTP/Word Processor

The Wapping Editor

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into and fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of other dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single disk drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a 16K image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'turbo DFS' which gives DFS access times comparable with those of ADFS.

The Page Layout Section

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module incorporates the facilities like: pencil, brush, airbrush, polygon, circle, eclipse, fill, cut & paste, etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

Word-Processor

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

The Font Editor

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individually proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser.

Wapping Editor Software Pack £69
Wapping Editor plus Mouse £89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

NEW At the request of many of our customers we are now able to offer training in the use of Wapping Editor DTP package. For further information please telephone 0923 37774 and ask for Tim or Shiraz

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc. Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

Wapping Font Disc 1

Sixteen additional fonts, including smaller version of Oberon and Daisy and two new sizes of the standard font for the Wapping editor.
Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.
Supplied complete with instructions. **£12**

Wapping Font Disc 2

This new addition to our Wapping range of DTP software provides you with additional 23 fonts for the Wapping Editor DTP pack. (80 track discs only). **£13**

Laser Direct

By using the power of the Archimedes RISC processor, it offers the best of both worlds – print speed up to 5 times faster than typical Laserjet compatibles – uses outline fonts so that any font can be scaled to any size – works with all programs that use RISC OS printer drivers. Ideal for use with Genesis, !Draw, Acorn DTP, Impression, etc. Includes 50 sheet paper tray and a single sheet/envelope tray. Requires one expansion slot and at least a 2Mbyte Archimedes. A very compact printer, a very low initial cost and very low running costs.

Special Price: £849

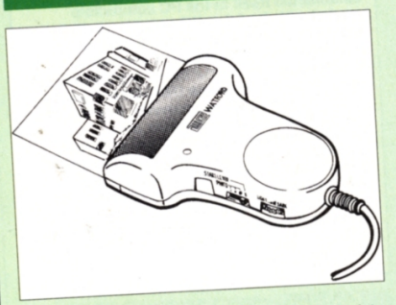
- Special High Res Laser Direct Card 600 DPI for Canon LPB4 Laser Printer **£325**
- LPB4 Printer plus High Res Card **£1025**

(For demonstration, call in at our retail shop)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

All prices are exclusive of VAT

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system, for only £149. The package includes the most comprehensive utility software available for the Archimedes, a high quality hand held scanner, and all necessary documentation to get you going straight away.

SCANNER

The scanner is capable of scanning up to an amazing 400 dots per inch (DPI)! The scanning area is 4" wide, and the height is only limited by the maximum amount of memory available. The dot resolution may be switched to 100, 200, 300 or the maximum 400 dpi. One of four operating modes may be selected offering either pure monochrome scanning, or one of three grey level modes. The grey level modes use different size dither patterns to represent up to 16 shades of grey. There is also a dial to allow the "brightness" to be adjusted over a wide range, in order to optimise the quality for any specific image. The scanner interface is a standard, single width, expansion card (podule) which plugs into the Archimedes' backplane. The socket on the rear panel connects the scanner by 1.8 metres of cable.

SCANNER SOFTWARE

Full use is made of the windowing and the multi-tasking facilities of RiscOS. The software is supplied in a 64Kbyte ROM located on the interface board. The scanner appears as a small icon on the desktop icon bar, and the software is retrieved from the ROM simply by clicking on that icon. As you scan a page, the image appears in the scanning window on the screen, scrolling up in real time. The other facilities included in the software are.

Cropping and scaling to any size including stretching and squashing in X and Y direction separately.

Colour tinting.
X and Y flip.

Edge detection which turns solid objects into outlines.

Selective directional copying which allows features (i.e. lines or text) to be made thicker or thinner.

Scanned images may be saved as sprite files or transferred directly into other RiscOS applications (DTP, Draw, Paint) simply by dragging the sprite file into the application's window. Sprites may also be generated using anti-aliasing. This greatly improves picture quality and is particularly effective when scanning material with a range of grey tones, such as photographs. Images can be printed on any printer that is supported by a RiscOS printer driver, with optional settings for portrait or landscape modes, image scale and positioning. Images are printed using the full resolution of the printer and are not limited to the screen resolution.

On-screen help is provided via the RiscOS interactive help facility. Calls are also provided in the ROM for users wishing to write their own software, incorporating the use of the scanner.

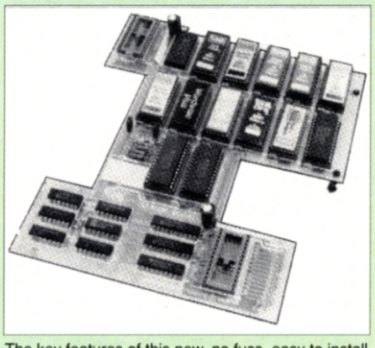
AHS-4 Archi 300/400 Version £149
AHS-3 Archi A3000 Version £175

Continued→ → → → → → → → →

STAFF VACANCIES

Watford Electronics is the leading supplier in the Acorn computer field and has established itself in the PC compatible market with its Aries PC computers. In its eighteen year history, Watford has always kept itself at the forefront of the new technology. Due to our latest expansion, we require staff to man our BBC/Archimedes and PC Technical Departments. Applicants will be required to be familiar with BBC/Archimedes hardware and software, and PC staff will need to be familiar with PC computer hardware. Good rates of pay, excellent prospects. Subsidised company accommodation is available to single persons if required. Telephone Keith Archer or Shiraz Jessa for interview, or write to us enclosing your CV.

Solderless Sideways ROM Socket Board



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

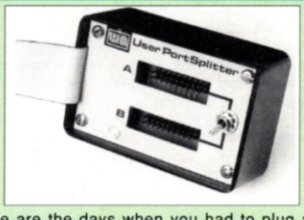
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

User Port Splitter Unit



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

Sideways ROM ZIF Socket System

Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)
- BBC, B and B+ compatible.

ONLY **£18** (carr £3)

BBC B Low Profile Cartridge System

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

• Complete System	**£11**
• Spare Cartridges	**£2.75**
• Spare Rack	**£1.65**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£9**; Quad **£14**

16K Disc Ram Module

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional Battery back-up fitted **£3**

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

Aries B-488 IEEE-488 Interface Unit

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

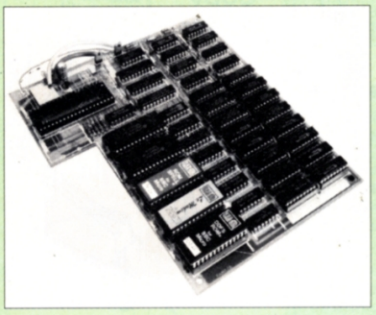
Voltmace Joysticks

Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B

Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128 **£25**

ROM/RAM Card



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 7 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

PRICES:

- ROM/RAM card with 32k dynamic RAM **£48**
- ROM/RAM card with 64k dynamic RAM **£65**
- ROM/RAM card with a massive 128k dynamic RAM **£109**

(carriage on ROM-RAM Card £3)

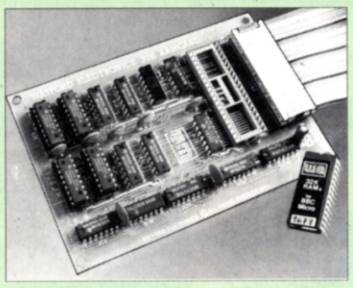
OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£9**
- 16k Dynamic RAM for Upgrade **£13**
- Battery backup **£3**
- Read and Write protect switches **£2 each**

Complete ROM-RAM board
All options installed **£115**

P.S.
IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K Shadow RAM/Printer Buffer Card Expansion Board



A MUST FOR WORD PROCESSING

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- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.
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- Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

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Wordwise plus

£40

We are giving away absolutely **FREE,** the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
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- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

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DISC Version for BBC B & B+	£14.00
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(When ordering please specify for which Micro & 40 or 80 track Disc)

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Epson FX & RX 80	£10
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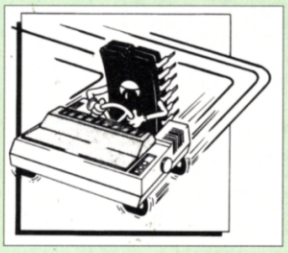
View Printer Driver ROM



View is a powerful word processor, but it seriously lacks in terms of printer driver support. With the View Printer Driver ROM, the View users will find themselves in the realms of advanced word processing.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips.

Price: Only £33

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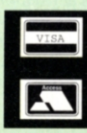

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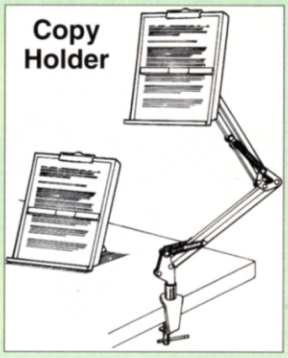

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The Epson RX/FX/KAGA Printer Commands Revealed Handbook

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

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Although Acorn machines (such as the BBC B, the Master, the Archimedes and the BBC A3000) are mainly used in education, most commercial computers use other operating systems, particularly MS-DOS. As a result school computer users are at a disadvantage when moving into 'business' computing. PCs and other commercial computers use MS-DOS as the operating system, so commands for formatting, copying, backing up, printing and the modem are not the same. Even file names are written differently! And did you know that there is one Acorn command which, if used in MS-DOS, wipes everything in the current directory?

'ACORN TO PC' enables you to change over painlessly. It shows clearly and quicly how, why and where the two systems (Acorn and MS-DOS) differ. As with a foreign language dictionary, you can use the book to transfer either way – from Acorn to MS-DOS, or from MS-DOS to Acorn.

'ACORN TO PC' also acts as a handy reference guide to all Acorn star commands and their MS-DOS equivalents. It also has an extensive and readable explanation of the directory tree and hierarchical filing systems in general. Both DFS and ADFS Acorn systems are covered.

'ACORN TO PC' is written clearly and concisely by Dr. John Lockley, who has wide experience of writing and broadcasting. He is currently appearing as a regular contributor on Radio 5, and is co-author of 'The Complete BBC Computer User Handbook'.

Price: £15.95 (No VAT)

The Complete BBC Computer User Handbook

If you own a BBC B, B+, Electron, Master 128 or Master Compact, or Archimedes, then this is the book for you. It shows how to get the best from your machine, and how to make it work for you. The general style and level of presentation means that both the expert and beginner alike will feel comfortable with the quality and quantity of the material.
Subjects covered include the general use of computers, hardware design and peripheral devices like printers, disc drives, etc, and Networking. Programming hints and tips and various disciplines for making a better program are discussed in some detail, including debugging of specific errors. Standard programs are covered, such as wordprocessors, spreadsheets, databases, graphics, communications, etc., which brings you neatly on to the subject of using computers in the office or at work – even giving advice on writing and marketing your own programs.
A book you will enjoy to use as a reference, or read from cover to cover, over and over.

Only: **£14.95** (No VAT)

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.
It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

Beeb PC (BASIC)

Beeb PC Basic is designed for program authors wishing to convert programs so that they will run on IBM personal computers. To convert BBC BASIC programs manually can waste days of valuable time with every occurrence of common statements such as PROC, DEFPROC, TAB, having to be changed.
Beeb PC (BASIC) automates many of these changes, and will convert majority of BBC statements that are invalid for IBM BASIC into equivalent acceptable statements. In addition BBC BASIC data files can be converted to IBM BASIC format, with support provided for all BBC data formats:- INTEGER, REAL & STRING.

Price: £38

Beeb DOS 3.0

(Now reads Archimedes Discs)

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual.
(Will only work on 360K Disk Drives & read only ADFS and Watford DDFS – not DFS).

Price: £39

(Please write in for technical literature)

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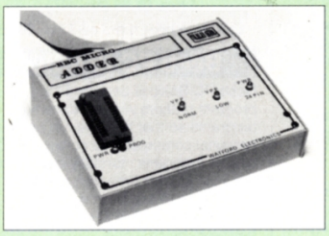
- 3M Media Premier Distributor

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: 2516, 2716, 2532, 2732, 2764, 27128, & 27256.

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!
The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

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Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

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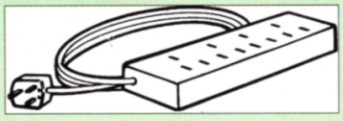
UHF Modulator	£4	16MHz Crystal	£2
Speaker Grill	£1	17.734 MHz Xtal	£2
Speaker	£3	32.768MHz Xtal	£1
Keyswitch	£1.50	BBC B Refurbish	
Master PSU	£59	Casing	£25
Master Keyboard	£62	Keyboard	£46
Master Casing	£49	Power Supply	£59
Replacement Flexible 17 way Keyboard Connector			£4

Surge Protector Plug

Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets.
Supplied wired up with mains plug ready for use.
Can be screwed to floor or wall if required.
Very useful for tidying up all the mains leads from your peripherals.

£9.50

Aries Spike Cleaner Unit

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete Computer/Hi-Fi System

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ROM Extraction Tool

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

Metal Chip Extractor **£3**

28pin DIL Header Plug

SOLDER type **£1.50** IDC CRIMP type **£1.95**

8 Way DIP Switch

Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

Only **£1.00**

28 pin ZIF SOCKET (Textool) **£6.95**

Connecting Leads

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug to 3 pin DIN Plug + 1 Jack Plug	£2.50
to 7 pin DIN Plug	£3.00
to 3 Jack Plugs	£2.50
6 pin DIN to 6 pin DIN Plug (RGB)	£3.00

Disc Drive Power Leads

Supply from BBC power supply to standard Disc Drive Connection: Single **£3.00**; Dual **£3.75**

Disc Drive Interface Leads

BBC to Disc Drives Ribbon Cable
Single **£4** Twin **£6**

Miscellaneous Connectors

	Plugs	Sockets
RGB (6 PIN DIN)	50p	75p
RS423 (5 pin Domino)	70p	80p
Cassette (7 pin DIN)	40p	95p
ECONET (5 pin DIN)	35p	50p
Paddles (15 pin 'D')	150p	250p
Disc Drive Plug 4 way	100p	–
6 way Power Connector	120p	150p

Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK £8

CHIP SHOP

1 MB-10 DIL D-RAM	£4.50
1 MB ZIP D-RAM	£4.90
256Kx4 100nS	£5.00
DS3691	£4.50
DS88LS120	£5.25
LM324	£0.45
SN76489	£5.50
SAA5050	£8.75
UPD7002	£6.00
2764-250nS	£3.00
27128A-250nS (12V5)	£2.50
27128-250nS (21V)	£4.00
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27512-2	£4.50
27C101G (1 Meg)	£7.00
4013	75p
4020	£1.00
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6512A	£10.00
6522	£4.00
6522A	£5.00
62256ALS-15	£10.00
62256P-12	£8.50
6818	£4.00
6845SP	£6.00
68B50	£2.95
68B54	£7.50
7438	50p
74LS00	25p
74LS04	25p
74LS10	25p
74LS123	£1.00
74LS163	£1.00
74LS244	£1.00
74LS245	£1.00
74ALS245	£2.75
74LS373	£1.00
74LS393	£1.00
75453	£1.00
75159	£3.00
9637	£2.00
ICL7673PA	£3.00

Assorted ROMS

ACORN ADFS	£25
ACORN BASIC 2 plus User Guide	£22
Acorn BCPL	£42
ACORN DNFS	£17
Acorn FORTH	£32
Acorn Graphics	£25
Acornsoft C Disc	£36
Acorn LISP	£19
Acorn OS B+	£25
Acorn OS 1.2	£14
Basic Editor	£24
BBC PCB Designer	£49
Beebmon	£22
Buffer & Backup	£20
Communicator	£49
Dump Out 3	£25
EPSON NLQ ROM	£25
Graphics Extension Rom	
GXR-B	£21
GXR-B+	£22
ICON Master	£28
Logotron LOGO	£43
MASTER OS ROM	£38
Master ULA (47)	£15
Master ULA (60)	£10
Micro Prolog	£25
Microtext Disc	£46
Microtext Rom	£199
NLQ DESIGNER	£25
Numerator – Archi	£69
Numerator – BBC	£39
Pendown ROM	£32
Rom Manager	£20
ROMIT	£29
SERIAL ULA	£13
TED	£35
Termulator B, B+	£28
Termulator Master	£32
Video ULA	£14
ULTRACALC II	£26
1Mb OS ROM	£39

ARIES PC 386-SX

The Aries PC 386-SX combines many of the powerful features of the 386 system with the frugality of a price tag more at home on a 286 system. With 8/16MHz CPU, this system provides virtually full 386 performance, including the more convenient scheme of memory control that allows easy configuration of expansion RAM as EMS for DOS application.

Features:

- 80386-SX CPU with optional 80287/80387 Maths Co-Processor
- 8/16 MHz selectable speed
- Legal Bios with built-in Setup routine
- OS/2 and XENIX compatible

Specifications:

- 1MB RAM on-Board expandable to 16Meg
- 1 x 5.25" – 1.2Meg Drive fitted
- 1 x 3.5" – 1.44Meg Drive fitted
- 40Meg 28mS Hard Disc Drive fitted (1:1 interlaced)
- HDD/FDD Controller Card
- 102 Key Keyboard
- Case with Keylock
- Eight expansion slots
- Two Serial and One Parallel Ports
- Logitech mouse
- 12 months On-Site maintenance
- £300 worth of Software, (MS DOS 3.30, GW BASIC 3.21, Digital Research's GEM, Finesse 1.1 DTP pack, Multiwriter Wordprocessor & Spellchecker, PC Organiser), **FREE** with every micro.

New Low prices:

- **System 1** – Specification as above plus a 14" High Resolution Flat Screen mono monitor **£995**
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- **System 4** – As system 3 (VGA) with 80MB 28mS fast Hard Disc Drive fitted **£1245**
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PCS-5L2	5.25" – 360K Cased Drive	**£86**
PCS-5H2	5.25" – 1M2 Cased Drive	**£99**

Our December 1990 catalogue now available. Please write in for your FREE copy

Aries Notebook PC XT & Notebook PC NB286-12

Full Desktop PC Power for People On The Move

First the desk top, then the luggable, then the lap top and now the notebook PC, a truly portable design of PC computer. Imagine an IBM PC compatible computer so small that it will fit inside your briefcase with room to spare, so light (just over 7 pounds) that it is easy to carry wherever you go.
Aries Notebook PCs are equipped with a full complement of 6 built-in ports; 2 x RS232 Serial; 1 x Printer; 1 x External floppy drive; an external Keyboard and a CGA colour monitor. The obvious benefits include the ability to connect directly to a printer, and to a full size desktop computer to transfer data or text, etc, or to a modem for communications.
Multiwriter 2 Word processor/spell checker, and PC Organiser diary software is supplied with all Notebook PCs to get you started, so now you can take computing power with you where you want to go, in the office, workshop or laboratory, on site, on the train, plane, or at home.

Aries Notebook I, II and III

These Aries Notebook PCs have energy-efficient 80C88 processor chips running at 10 MHz. Model I is supplied complete with a single 3.5" – 1.44MB floppy drive. The Notebook Model II and III are supplied with a 28mS fast access hard disc, 20MB and 60MB respectively.
In his independent review (Computer Shopper) the reviewer writes, 'The Aries Portable offers exceptional value for money . . . The computer itself is very much what you'd expect a notebook to be, small, with a cramped but very usable keyboard and a respectable backlit display. It is nice to see that you can actually use the extra 384K as EMS memory – there is even a utility that can turn the EMS into a RAM drive for you.'
In his final verdict he writes, 'Overall, the single most outstanding feature has to be the price tag. A notebook PC with hard disc for under £1,000 has no competition at the moment. If you have a small briefcase, weak arms, or just like the concept of a truly portable computer, then this is your man'.

Aries Notebook NB286-12

The New Aries NB286-12 has a faster, high efficiency 80286 processor running at 12MHz.

'. . . the strongest feature of the Aries is its Hard Disc, with a data transfer rate that would put most desktops to shame . . . the only notebook reviewed that incorporates a 16MHz processor (landmark speed). These two factors combine to make it the strongest performer . . .'

'In terms of value, the Watford comes up on top . . .'

'VERDICT: Excellent specification and performance. This has to be THE choice based on price and ability'.

Computer Shopper Jan. 1991

Specifications

Processor:	80286 running at 10MHz (Notebook I, II & III); 80286 (Notebook NB286-12) running at 12MHz – Zero Wait State – Real Time Clock/Calendar
Memory:	1MB RAM – 640KB + 384KB LIM/EMS
Drive:	Internal: 3.5" Floppy Drive (Notebook I) – 2.5 " 20MB Hard Disc (Notebook II & Notebook NB286-12); Notebook III has an internal 2.5" 40MB Hard Drive all 28mS Access speed – Optional external 3.5" or 5.25" floppy drive
Display:	Electro-luminescent (EL) backlit transflective supertwist LCD – 80 x 25 characters – 640 x 200 bit mapped IBM CGA compatible
Keyboard:	Full size Qwerty layout – Integrated Numeric Keypad
Power:	Internal NiCad battery – External 12V DC – Mains Adaptor provided Standard
Interfaces:	Parallel Printer Port – Twin RS232 Serial Ports – External Disc Drive Port – CGA Colour Monitor Port – External Keyboard or PS/2 Mouse Port
Dimensions:	300mm (W) x 220mm (D) x 61mm (H)
Bundled Software:	MSDOS 3.3; GWBASIC; Word Processor software – PC Organiser Software – Desk Diary & Calendar
Optional Extras:	External 3.5" Disc Drive – External 5.25" Disc Drive

- **Notebook I –** with Internal 3.5" 1.4MB Floppy **£599**
- **Notebook II –** with Internal 20MB Hard Disc **£779**
- **Notebook III –** with Internal 40MB Hard Disc **£799**
- **Notebook NB286-12 –** with Internal 3.5" – 1.4MB Floppy and 28mS 20MB 2.5" Hard Disc **£999**

Accessories

- **External 3.5" 1.44MB Floppy Drive** **£89**
- **External 5.25" 1.2MB Floppy Drive** **£89**
- **Spare Battery Pack** **£29**
- **Car Cigar Lighter Adaptor** **£35**
- **Carrying Case** **£28**

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At £139.50* it pays to put technology in its place

Compatible with the majority of PC Systems currently available its many assets include a steel cantilever frame – full cable management – heavy duty lockable castors – heat/stain/scratch resistant working surfaces available in either cream or grey – a full depth drawer unit which can be assembled for left or right hand use and with overall dimensions of H35" W47" D29" it can negotiate a standard 30" doorway with ease.

The unit comes complete with 12 months guarantee and can be delivered within U.K. Mainland for an extra £12.50.

To order simply complete and send the coupon or telephone for further details.

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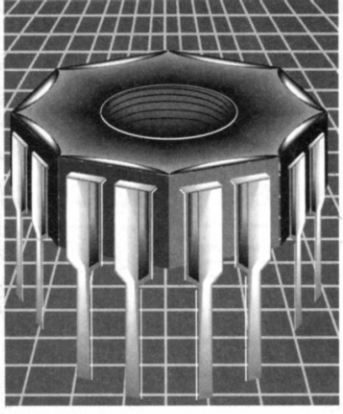


On closer examination..

Terry Blunt goes bug hunting with a new ARM utility

THERE has been a need for a professionally presented machine code monitor for the Archimedes for some time. Now ArcMonitor from CIS fills the gap and promises to make life much easier for ARM code programmers.

Product: ArcMonitor
Price: £24.95
Supplier: CIS, 8 Herbrand Street, London WC1N 1HZ.
Tel: 071-833 4023
Requirements: A3000 and Archimedes range

The AM package consists of a hard folder with single disc and a manual which, although it only covers four sides of A5, is perfectly adequate. Indeed, I was able to make my way around AM quite well without it.

CIS make no attempt to explain what a machine code monitor is, presumably on the assumption that if you don't know, you don't need one.

The disc has a single application and a help file with some update information. The application loads the AM module and provides a DeskTop entry from the icon bar. There are also a couple of demonstration programs inside the application.

The AM module itself takes up only 30k of RMA and is entered with the single *AM command. If this is the first time the module has been called the main display will be centered around &8000 and the highlighted memory pointer will be set to this value.

You can optionally add an address parameter to the command and if you exit and later return to AM the display and memory pointer and all registers will be where you left them.

Once you have entered AM all control, apart from number entry, is via the mouse, but if you have an Arm 3 upgrade you will probably need to disable it. This is because through an oversight it results in the main window scrolling so fast that it is very difficult to get precisely to a particular address.

The only other complaint I have is the use of Mode 0 for the display with inverse video highlights. While I appreciate the desire for low memory demands, even a four colour mode would have permitted colours to be used effectively, thus giving a clearer display.

The bulk of the display is given over to the disassembler listing. This can be toggled with a memory dump, which in itself can be a Hex dump, Ascii, or 32 bit words. All 15 registers are displayed on the right hand side of the display, along with the processor mode and flags.

Below are various icons for the tools available. This includes moving through the code, setting and listing breakpoints, tracing and executing. Underneath this there is an on-screen help window. As a rule, any pointer position that produces a response in this window is an editable field.

As well as the familiar breakpoints, AM allows you to alter registers and edit the memory contents. Alterations can be made numerically or by copying, dragging one value on to another including the program counter. Even processor mode and flags can be altered.

AM will correctly follow your program in and out of the processor modes, although you should use this with some caution. You can single step, or execute to the next breakpoint.

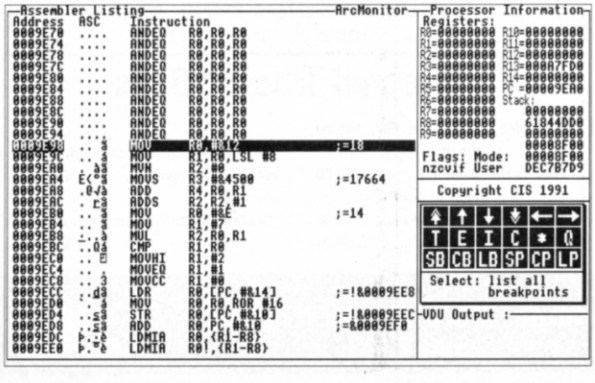
AM can even be called from within a running program to allow you to step through a particular area where you suspect trouble.

Probably the most interesting and novel feature is the ability to protect areas of memory. This is only really practical with the position-independent code generated by the ARM.

Basically, you define a buffer for the area you want to protect. The code is copied to it and all writes performed on the copy. This is particularly useful for protecting the operating system workspace from rogue programs.

To quit AM you click on the Q icon and the module will thoughtfully return you to the environment and screen mode at entry.

Finally there are three light-hearted, harmless surprises. I won't spoil them for you, just wander around the display with the mouse and you'll find them.



ArcMoniter in use

Summing up

In spite of two minor complaints, ArcMonitor is a well designed, easy to use utility that I can recommend to serious ARM code programmers.

PINEAPPLE SOFTWARE

The Pineapple Software Real Time Colour Video Digitiser

The Pineapple Software Real Time Colour Video Digitiser is now supplied with not just one, but two fully multitasking application programs! In fact the software supplied with each Digitiser comprises at least four different programs, (the number is increasing all the time). Included in these is the !Micci application which is probably the most user friendly of all video processing programs. (See photo).

HARDWARE

The Digitiser hardware consists of a double width podule which plugs straight into the back of a 300 or 400 series Archimedes. (Note that a podule backplane is required in 300 series computers).

For A3000 owners we supply a special inexpensive adapter box which contains the digitiser card and plugs into the back of the A3000 using a ribbon cable.

Inputs are provided for PAL composite video and also R,G,B. Manual adjustment of Contrast, Saturation and Brightness provide for ease of initial setting up.

SOFTWARE

The Heart of the Digitiser software is a relocatable module which contains all the video processing routines. All of the previously mentioned software applications access these routines in various ways. For the user who can write simple BASIC programs this module provides easy access to all of the Digitiser routines via '*' commands and SWI's

The new multitasking software makes life very easy for those who wish to incorporate images into Wordprocessing, Desktop publishing, or Art packages. The ease with which grabbed images can be 'zoomed in' and 'cropped' to the required size has to be seen to be believed, and when the required part of the image is selected, it is then a simple matter to 'drag' the image directly into another application.

As well as providing it's own powerful processing routines the Pineapple Digitiser can just as easily use software such as ChangeFSI or AIM to process it's images giving unrivaled versatility.

Also now available in the Multitasking software is a routine to allow capture of a sequence of frames. The number which can be stored depends on the amount of memory you have available (and the size of image chosen), and when grabbed the images can be stored to disc or transferred to PAINT for analysis.

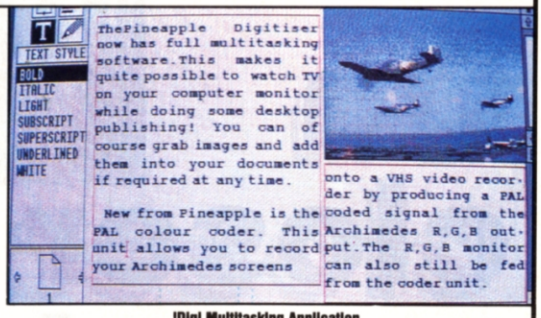
EXCLUSIVE FEATURES

The Pineapple Software Real Time Colour Digitiser is the only one currently ilable with the following exclusive features:-

1. 16 bit operation (extended version) for smoother colour graduations.
2. Two independent multitasking applications plus other powerful software.
3. Digitising of the full video area normally displayed on a TV screen.
4. R,G,B inputs providing higher quality pictures from professional video equipment.

SPECIFICATION

Video Inputs	Pal coded video. 75 volts – 2.5 volts pk to pk. R,G,B, & sync input All inputs may be terminated by internal DIP switches.
Resolution	512 x 256 pixels
Storage system	Standard version 4 bits Red, 4 bits Green, 4 bits Blue – 192k Ram Extended version 5 bits Red, 6 bits Green, 5 bits Blue – 256k Ram
Picture Area	The Digitiser hardware allows the full screen area normally viewed to be stored in the podule ram. Horizontal shift, Vertical shift and width can be adjusted internally if required.
PAL Decoder	The PAL decoder provides manual control of Brightness, Contrast and Saturation, combined with full auto saturation control.



!Digi Multitasking Application

!MICCI Application

Butterfly collection

PAL COLOUR CODER

A new hardware product now available from Pineapple is a high quality colour coder video unit. This unit produces a full colour coded video signal from the Archimedes computer which enables you to feed the output of the computer into a video recorder or second colour TV monitor.

FEATURES:-

1. External to computer – no podule slots required.
2. Complete sync pulse regeneration to provide the best possible signal for recording onto VHS recorders or displaying on TV monitors.
3. Switch selectable to 624 or 625 line operation – for interlaced or non-interlaced screen modes.
4. Plugs into R,G,B, computer socket and provides buffered output to feed Archimedes monitor, + coded signal output.
5. Adaptable for use with other computers or R,G,B and Sync signal sources.

Price £69.00 + VAT p&p free

– 'Pineapple has produced one of the 'ultimate' Computer Video Digitisers' –

– 'The Pineapple Colour Digitiser looks to be one of the most professional products yet to be seen on the Archimedes' –

Acorn User – April 90

Digitiser Prices

Standard	**£285.00**
Extended	**£315.00**
A3000 Adaptor Box	**£65.00**

POSTAGE AND PACKING FREE

NEW LOW PRICES!!! NEW LOW PRICES!!!

BBC PCB Designer

NEW LOW PRICES!!! NEW LOW PRICES!!!

This ever popular Rom based PCB designer is suitable for all BBC micros. It's fast high density 1:1 scale print routine allows prototype boards to be made directly from a printout, and a 2:1 scale print may also be used to produce professional quality boards. A second Eprom is optionally available to add a powerful auto-track routing facility to the program. This utilises a 'rats-nest' input rountine and allows any component to be 'picked up' and moved around the board without having to re-specify component interconnection.

The full auto-route facilities are available even on a standard unexpanded model 'B'.

'PCB Autoroute is remarkable. No similar software comes near the price. *Acorn User* – Aug 88

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Access

More power to your permutations

£10 Prize letter

PHIL Bender's permutation program in the March issue of The Micro User was good, but could have been a lot better and still stayed short.

The REPEAT-UNTIL loop limitation that restricts strings to 20 characters – forgetting the 1.6 billion years processing time for a moment – can be circumvented.

The routine doesn't filter out duplicated permutations brought about by repeated characters, for example a 26 character string composed of one letter 21 times and another one 5 times, has only 65780 permutations and should be in reach of the BBC Micro.

Where permutations are being produced for a specific purpose a lot of time can be saved if certain unacceptable groups are rejected automatically.

I've been playing around with permutations and combinations for about eight years and here's the listing I usually use – I've altered it slightly to match Phil's style. It doesn't contain an automatic rejection facility.

At worst it takes just over two hours to generate all the 362880 permutations of nine distinct characters, but if any are repeated the time is reduced considerably. As a bonus the routine can be easily re-written into machine code in which case, using screen memory to hold the string, the nine character benchmark test takes less than 25 seconds. – **John Barnes, Norwich.**

```
  10 REM > Permutatns
  20 REM ------------
  30 REM by John Barnes
 100 WIDTH 0
 110 CLS:INPUT'''"Type in a
 string"''"This program will
 then print all the permutat
ions of that string"''word$:
N%=LEN(word$):CLS
 120 DIM A% N%+2
 130 $A%=CHR$0+word$
 140 PROCsort
 150 W%=N%+3:WIDTH (39DIVW%
)*W%
 160 TIME=0
 170 REPEAT PRINT $(A%+1)SP
C3;:K%=N%+1
 180 REPEAT K%=K%-1:UNTIL A
%?(K%-1)<A%?K%
 190 IF K%=1 GOTO 230
 200 S%=N%+1:REPEAT S%=S%-1
:UNTIL A%?(K%-1)<A%?S%
 210 T%=A%?(K%-1):A%?(K%-1)
=A%?S%:A%?S%=T%
 220 IF K%<N% FOR S%=0 TO I
NT((N%-K%)/2):T%=A%?(K%+S%):
A%?(K%+S%)=A%?(N%-S%):A%?(N%
-S%)=T%:NEXT
 230 UNTIL K%=1
 240 PRINT INT(TIME/6000+0.
5)" mins"
 250 WIDTH 0
 260 END
 270 DEFPROCsort
 280 FOR X%=1 TO N%-1:FOR Y
%=1 TO N%-X%:IF A%?Y%>A%?(Y%
+1) T%=A%?Y%:A%?Y%=A%?(Y%+1)
:A%?(Y%+1)=T%
 290 NEXT:NEXT:ENDPROC
```

Win a tenner

WANT to write to The Micro User? The addess is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

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Unusual icons

I HAVE a BBC A3000 and am very satisfied with it. Only one small thing puzzles me: Many of the programs on the PD discs and your subscription disc don't have regular icons and, in fact, the programs are really directories that can be opened up by double-clicking with Shift held down.

Can you explain how I can do this myself? – **Simon Karger, London.**

● The approach Acorn adopted for applications, as opposed to simple programs or data files, was an attempt to copy the Apple Macintosh of allowing major programs to have their own easily distinguishable icons but still maintaining compatibility with the original Arthur operating system.

As you have correctly spotted, they are just directories but the name must always start with !. Interestingly, a different character was chosen originally but later changed to so that applications would always appear first in directory listings.

A typical mono-tasking application will contain four files: !Boot, !Run, !Sprites and !RunImage, while multitasking ones will also have Templates and Sprites.

!Boot is run when an application is first examined by the Filer, it is usually used to set up a system variable that informs the Filer where the application actually is in the disc structure.

The !Sprites file is loaded by the Filer into the common pool of sprites and contains, at least, the icon that appears in the Filer window. If there's no !Boot file, !Sprites is loaded automatically, otherwise a special command – IconSprites – is used.

The !Run file is executed when the application icon is double-clicked and its final instruction should be to run the !RunImage file which is the application program itself.

Templates contains the window descriptions and Sprites has any special sprites for the windows – these two files are referred to as resources.

We will be running a number of articles explaining in more depth the ins and outs of writing applications.

More Flare than that

I WOULD like to reply to your review of Flare by Silica Software Systems in the January issue, especially your final summing up: Worth buying if you haven't got anything better.

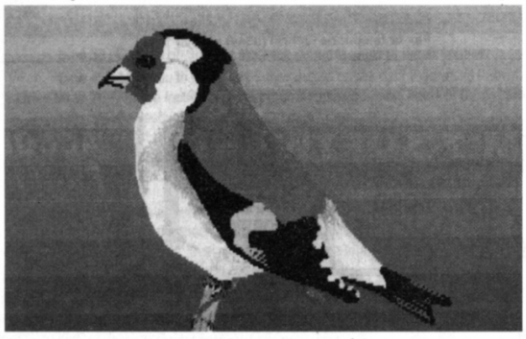
I am a Head of Computing and IT Coordinator at a seondary school in Derby with at least seven years IT teaching experience. In my opinion – and that of several of my colleagues – Flare deserves a beter review than this, especially in regard to school use.

I accept that it is not fully Risc OS, but it has proved to be the most popular and easily-used piece of graphic-based software I have yet seen.

The power of Flare is the ease of allowing the user to do what they want to without referring to complicated menus or documentation. Also the ease of printing both to mono and colour printers is very good.

If you have ever experienced up to 25 pupils all wanting a copy from three printers with five minutes of the lesson to go you will appreciate how good Flare is.

Its ability to get such a large number of saved files on to one disc means less class sets, again another good point when you consider the ever growing store of class sets



Art by Flare

Archimedes are requiring.

It has proved very popular with novice teachers who after only 30 minutes can be moved on to something more demanding, in fact I think it has helped me convert more teachers to the benefits of computing than any other piece of software I have used.

Another factor is that we bought our site license from Silica for less than £50 and have found it has met nearly all our requirements for a graphics package. Comparing this price with other drawing packages I think it exceedingly good value when you consider how tight school budgets are.

With the coming of Technology and the requirement that pupils can choose subject areas to design or make their artefact, the need for very easy to use software with a wide range of abilities is a tremendous aid to the ever increasing workload teachers now have.

As a matter of interest it has been my main piece of software for my Technology 1st and 2nd years – about 230 pupils – who throughout the year will all have to use and produce a design. Groups so far all have made a cover for greetings cards and some of the work was very good.

I know your magazine is not intended totally for the education world, but many of my colleagues read The Micro User and, as I do, often make important decisions on what you have evaluated. It seems a shame that something that has been such a benefit to me and I know would be to others possibly won't, due to your article.

Even so this is the first time I have written to you after seven years of reading so I can't be too critical, as many of your articles and listings have been of great use to me. – **Dave Burridge, Head of Compuer Studies/CAL, IT Coordinator, The Village Community School, Old Normanton, Derby.**

Protext points

I WOULD like to make a couple of comments regarding Paul Hendy's review of Protext v5 for the Archimedes published in your March 1991 issue.

Paul says he'd prefer a spelling checker to work through the text so that he can see what's going on. Well Protext has two options for this: Either using the check as you type, or Control+S from Edit mode – these both show the error as it occurs in context.

Also centering with Control+C isn't lost when the text is reformatted. – **Douglas Thompson, Arnor Ltd., 611 Lincoln Rd., Peterborough PE1 3HA.**

Not more women

IT would be interesting to know on what evidence Mrs Pegg (March 1991) bases her belief that more women use computers than men – you may be interested in some of the results from an analysis of computing I have recently completed within the firm for which I work.

If we agree that word processing, robotic control and analysis, warehouse bar-coding and picking, sales reps using their home modems and so on, as well as traditional accounting, personnel, stores inventory, research and development, and design are all valid computer uses then 72 per cent of our men and only 47 per cent of our women are computer users.

That applies to our 28,000 UK staff and in taking to other companies the proportions seem to hold true. One bit of the breakdown puzzles us though: Of our programming /analytical staff 92 per cent of the Cobol and Fortran workers are women, while for Basic 94 per cent are men. Would any reader like to hazard a guess, please?

In reply to Rod Falconer's letter about business, from the same issue, any present day school leaver will have been using computers for at least 10 years. Perhaps he could find some local youngster who would jump at the chance to brew up some programs.

Even commercially available business packages have to be tweaked to match them to the needs of the buyer. In the end it's usually cheaper to produce your own in-house software. – **R. H. Hill, Woodford Green, Essex.**

More power computing

I READ the letter from Graham Evans in the April issue about calculating 1.0000001 to the 134217728th power. The major difference shows that BBC Basic has the advantage, presumably because of its non-standard five byte floating point format.

I have run the same calculation on my Archimedes A440 which is fitted with a floating point unit. Using the ABC compiler I was able to compare single, double and extended precision floating point calculations, you may find the results interesting:

	Answer	Error
Single (4 byte)	674530.5	$4.343862257 \times 10^{-6}$
Double (8 byte)	674530.4707	0 or $5.49861777 \times 10^{-6}$
Extended (12 byte)	674530.4707	0 or $5.49866782 \times 10^{-6}$

Clearly an answer very close to the hand calculation can be found with the four byte accuracy. With Double or extended a greater precision of hand calculated values is needed to assess their actual worth.

On an Archimedes fitted with an FPU there's no need to worry about rounding accuracy until you start running Mandelbröt set calculations at 7×10^{15} magnification. – **Dr. Ian Entwhistle, Sittingbourne, Kent.**

Bouncing application

BACK in September 1990 you gave a reply about getting my Bouncers demo program (from the January 1989 issue) to run on the Risc OS, the main problem being that Risc OS always reduces the memory allocated for screen use to the minimum currently needed.

Well a more permanent and easy to use solution – which can be applied to many different programs – is to turn the Bounce program into an application, which is actually very easy.

The first step is to create a new directory, using the Filer menu, called !Bounce. Open this up by double-clicking with Shift held down and copy the Bouncers program itself plus the module called MemAlloc. You'll find that in the !Lander application on your Apps2 disc. Now rename the Bouncers program to !RunImage.

Load up !Edit and using the iconbar menu create a new Obey file and type in the following lines:

```
Set Bounce$Dir <Obey$Dir>
RMEnsure MemAlloc 0 RMLoad
<Bounce$Dir>.MemAlloc
ScreenSize 480k Error 0 Not
enough memory for screen
RMKill MemAlloc
WimpSlot -min 32k -max 32k
Run <Bounce$Dir>.!RunImage
```

Save this in the !Bounce directory as !Run.

You could also create a sprite for the application: Make it 17 high by 34 wide, Mode 12, with mask and called !bounce. Then save it into the directory as !Sprites.

Making these alterations will ensure that there's always

Ovation update

AS software for the Archimedes becomes more and more sophisticated it must become difficult for a writer to really get to grips with a piece of software when producing a review. They may well be using alternative packages on a regular basis and it's hard not to draw comparisons.

For this reason I feel I should make some comments about Bruce Goatly's review of Beebug's Ovation package as I've been using it from its release.

In regard to flowing text around both sides of a frame, what's the point of doing it anyway? If each line is split it makes the text harder to read doesn't it?

It's true that decorative borders must appear on all sides of a frame, but I don't feel this is a major disadvantage. Simple borders can be drawn in without difficulty if you want them only on one side.

Guide lines can be positioned with great accuracy if a big enough scale is chosen, or altered via a dialogue box. Also movement of frames can be restricted to just vertical or horizontal hence aiding positioning. Master pages can be altered retroactively – see page 60 of the manual.

There were quite a few other small errors too but there's little point in going into them all. Although the review was generally complimentary the little, perhaps misinformed, niggles splattered about the text may put readers off buying this very worthwhile package. – **C. E. Johnson, Warrington, Cheshire.**

● As you say, it is natural for reviewers to be unconciously affected by their personal likes – there can never be a true dispassionate review because so much depends on personal needs and preferences.

A review is only a personal opinion. In cases where you want to buy major software packages it is essential to test run the software for a couple of hours at least to see whether you like the feel of it. If possible try out an example of the type of job you want it for to see if it can cope.

enough screen memory for it to run and Bouncers will work just like any other Risc OS application. Just double-click to run. – **Stuart Tyrell, St. Helens, Merseyside.**

To upgrade or not?

MY system comprises an issue four Electron with a Slogger TurboDriver and Plus One. Unfortunately the Turbo is stuck permanently on so I'd like Slogger's new address please.

More importantly though, I'm soon going to be needing word processing facilities along with a disc drive. Do you think I should buy a disc drive and printer for my Electron or upgrade to a BBC Micro or even a BBC A3000? – **Colin Brown, East Kilbride, Strathclyde.**

● What you do depends very largely on what your precise needs will be. Clearly a printer is essential. A 9-pin Epson-compatible will serve for any machine you buy but if you go to the 32 bit machine a 24-pin will provide better and quicker rendering of the fonts and graphics used. A BubbleJet printer is quieter and produces smoother edges but is more expensive.

The best word processor for the BBC Micro is probably Inter-Word which provides a *wysiwyg* – what you see is what you get – display. While for the Electron you could get Wordwise Plus with the Jaffa systems Second Processor, which means it won't be too important which disc system you get as you'll still have plenty of memory for the words.

There isn't really a definitive answer to your question. Quality and ease of use depend solely on how much you want to spend.

Slogger Computers can be contacted on 0736 787272.

More patience provided

IN response to your request for King Albert Patience converted to the Archimedes I spent an evening porting it across to my A3000. The main changes involve using Mode 12 for the higher resolution graphics, sound effects added and it's now in an application directory.

There were some minor changes like re-positioning the card pictures a little so that they're more centred for Mode 12 and a few changes to the display itself. Otherwise I've left it pretty much the way it was for ease of use – and because it wasn't mine in the first place. – **David Shepherdson, Ilkley, West Yorkshire.**

● The Archimedes version of this immensely popular game has been included on this month's subscription disc.

Business minded

I RUN a mail order business and was very interested to read Rod Falconer's letter in the March issue. I have a BBC A3000 and use it to good effect – writing this letter for example.I agree that it would be useful to have a section dedicated to the business user as you already cater for the Education and Games markets.

I feel sure that with a dedicated section more people would start to think in terms of using their Archimedes' for business. This could only lead to more sales of hardware and encourage software houses to produce more applications. – **Tim Cowley, Corby, Northants**

Disappearing program lines

I BEGAN typing in the Make Four listing from your March 1991 issue only to find that there are a whole block of lines missing completely. Could you print them please, as I'd really like to play the game? – **Philip Costall, Birmingham.**

● We were surprised too, under our new system it's difficult to lose text like that, but we seem to have managed it. Here are the missing lines:

```
280 ENDPROC
 290 :
 300 DEFPROCinitialisevars
 310 LOCAL char%,ch%
 320 board%=&5700:code%=&57
AD
 330 board$=STRING$(9,"*")+
STRING$(6,"*"+STRING$(7,".")
+"*")+STRING$(9,"*")
 340 ?&70=0:?&71=&57
 350 human%=ASC("H"):comput
er%=ASC("C")
 360 DIM height%(8)
 370 level%=1:c3%=16:c2%=7:
h3%=10:h2%=4
 380 computerwins%=0:humanw
```

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

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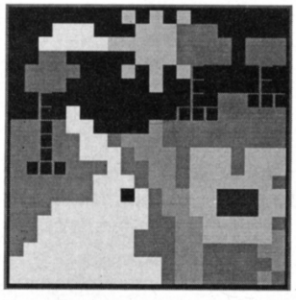
Access VISA

Mosaic



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Tel. 0707 265443
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Maximise your modules

Steven de Rooy offers much more power at the touch of button

ALTHOUGH the Archimedes and BBC A3000 can load very quickly from disc it's nice to have short utilities and routines available on hand at all times. Unfortunately the nature of the machine means that they have to be multi-tasking as well, and that's a lot of programming.

Now there's a way of having mono-tasking routines available all the time. The secret is to put the program into a module, and with this program – AppToMod – it can be written in machine code or even Basic.

Only one command – and therefore program – is possible per module and the program's parameters are read in a slightly different way to normal.

If there are no parameters, the program is immediately called. Otherwise one of two methods is used:

- With a machine code program, the module is called as an application, so that your parameters can be read with SWI "OS_GetEnv" instead of getting R0 as a command tail pointer which disc-based utilities usually do.
- If your utility is written in Basic the parameters are passed via the keyboard buffer, so that you can read them like this:

```
10 REM >
20 REM ....
30 :
40 INPUT "" params$
50 ....
```

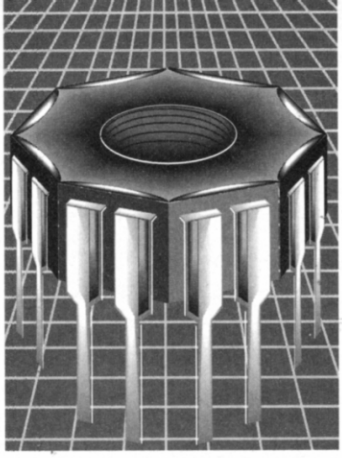
This isn't visible on the screen as the module switches off the screen display with VDU21 before calling Basic. A VDU6 code is added to the keyboard buffer so that the screen drivers are switched on again using the INPUT command.

You also don't see the message of Basic being initialised this way. This is the most convenient way of calling Basic without losing the parameters.

So type in the listing shown here and ensure it is correct using the checksums, then to create a program in a module run it and provide the following information:

- Old application's filename.
- New (destination) filename.
- Name of the module.
- Version number, such as 1.00.
- Command name; Format, for example.
- Command help message like *prepares a disc for use with the ADFS.*
- Minimum number of parameters
- Maximum number of parameters
- Command syntax, for example: *<drive> [LIDIE].*
- Relocation address. Optional and only if the file isn't Basic, which is always relocated to &8F00 by the *Basic -chain @ command. The use of @ allows Basic to take the program from a specific memory address rather than a file.

The module is then put together and saved using the appropriate file name ready



for you to load into the RMA. Once there you can invoke the program just by typing the command, plus any parameters required.

Suck it and see

Here's a sample program you can use to try out the program:

```
10 REM > $.PrintInMod
20 REM by Me
30 INPUT""print$
40 IF print$="" THEN
50     PRINT"No parameters"
60   ELSE
70     PRINT param$
80   ENDIF
90 END
```

Save it and run the AppToMod utility, enter answers that are appropriate to your system, use the command *PRINTIT*, zero for minimum parameters and maximum to one. Load it up by double-clicking its icon then press f12 and type:

```
PRINTIT Hello
```

And that's precisely what should happen.

Customisation

System variables – a complex subject in their own right – allow you to alter the way your micro behaves. In particular the *Alias* can be used to intercept the usual system commands and redirect them.

Let's say you've written a special disc formatting program that you want to use instead of the one provided by the ADFS Filer. Using AppToMod you can put it into a module that is automatically loaded each time you switch on your machine.

But clearly you still want to use the menu option on the ADFS icon – it's much simpler than pressing f12 and then typing your own command.

So along with the command in your boot file that loads the module you can issue the command:

```
Set Alias$Format MyFormat %*0
```

When a format command is issued the Aliases are checked and if a redirection is found the original command is stripped off and the parameters are added to the new command.

- *So with all your little utilities instantly available and system variables to control your machine, you can make your micro suit your needs.*

```
  10 REM > <BasicSave$Dir>.AppToMod
  20 REM By Steven de Rooy
  30 REM (c) The Micro User
  40 :
  50 MODE 0
  60 PRINT "Application to Module, by S
teven de Rooy"'"(c) The Micro User"'
  70 INPUT "Enter the old application's
 filename: "file1$
  80 INPUT "Enter new filename: "file2$
  90 :
 100 chan%=OPENIN file1$
 110 IF chan%=0:PRINT "File not found -
 try again."':GOTO 70
 120 size%=EXT #chan%
 130 bas%=(BGET #chan%=&0D AND BGET #ch
an%=&00) :REM is it BASIC?
 140 CLOSE #chan%
 150 PRINT "Size: "+STR$size%+". The fi
le is ";
 160 IF bas%:PRINT "a";:ELSE PRINT "no"
;
 170 PRINT " BASIC file."'
 180 INPUT "Enter module name: "name$
 190 INPUT "Enter version string (e.g.
'1.00'): "version$
 200 IF LENversion$<>4:GOTO 190
 210 INPUT "Enter command name: "comman
d$
 220 PRINT "Enter command help: *"+comm
and$;
 230 INPUT " "help$
 240 syntax$=""
 250 minp%=0:maxp%=0
 260 INPUT "Enter the min. number of pa
rameters for command: "minp%
 270 INPUT "Enter the max. number of pa
```

➤

```
➤
rameters for command: "maxp%
  280 IF minp%>maxp%:PRINT '"Minimum > m
aximum -> enter again.":GOTO 260
  290 IF maxp%>0 THEN
  300 PRINT "Syntax: *"+command$;
  310 INPUT " "syntax$
  320 ENDIF
  330 IF NOT bas% THEN
  340 INPUT "Relocate to address (<RET>
for no relocate): &"rela$
  350 rela%=EVAL("&"+rela$)
  360 ENDIF
  370 :
  380 DIM code% &1000+size%
  390 FOR pass%=4 TO 6 STEP 2
  400 P%=0:O%=code%
  410 [OPT pass%
  420 EQUD FNapp ; Module is an applicat
ion?
  430 EQUD 0     ; No initialise
  440 EQUD 0     ; No finalise
  450 EQUD 0     ; No service calls
  460 EQUD ttle  ; Title string.
  470 EQUD help  ; Help string.
  480 EQUD tble  ; Help and command keyw
ord table.
  490 :
  500 .ttle
  510 =name$:=0
  520 ALIGN
  530 :
  540 .help
  550 =FNhelp
  560 ALIGN
  570 :
  580 .tble
  590 =command$:=0
  600 ALIGN
  610 EQUD modl                  ; Module
start
  620 EQUD (minp%+(maxp%<<16)) ; Paramet
ers
  630 EQUD comsyntax             ; syntax
  640 EQUD comhelp               ; help
  650 :
  660 EQUD 0                     ; No more
 commands.
  670 :
  680 .comhelp
  690 ="*":=27:=0:=32:=help$:=13
  700 .comsyntax
  710 =27:=1:=32:=syntax$:=0
  720 ALIGN
  730 :
  740 .modl ; here the code will start
  750 FNstartcod                 ; Pass pa
rameters to module, if available
  760 .module                    ; Load mo
dule here
  770 ]:NEXT
  780 :
  790 PRINT '"Assembled; code size "+STR
$P%+" bytes."
  800 PRINT '"Loading file '"+file1$+"'.
.."
  810 OSCLI "Load "+file1$+" "+STR$~(cod
e%+module)
  820 PRINT '"Saving module as '"+file2$
+"'."
  830 OSCLI "Save "+file2$+" "+STR$~code
%+"+"+STR$~(P%+size%)
  840 OSCLI "SetType "+file2$+" Module"
  850 PRINT '"Module created - Press F1
 to run it."
  860 OSCLI "Key1 *RMLoad "+file2$+"|M"
  870 END
  880 :
  890 DEFFNstartcod
  900 IF maxp%>0 THEN
  910 IF NOT bas% THEN
  920 [OPT pass%
  930 MOV R2,R0                  ; R2 = co
mmand's tail
  940 ADR R1,ttle                ; R1 = po
inter to module name
  950 MOV R0,#2                  ; R0 = 2
  960 SWI "OS_Module"            ; Enter m
odule.
  970 .mods
  980 ]
  990 IF rela%<>0 THEN
 1000 [OPT pass%
 1010 MOV R0,#rela% AND &FF0000
 1020 ORR R0,R0,#rela% AND &FF00
 1030 ORR R0,R0,#rela% AND &FF
 1040 MOV R11,R0                ; Jump to
 when finished
 1050 ADR R1,module
 1060 ADD R2,R1,#size% AND &FF0000
 1070 ADD R2,R2,#size% AND &FF00
 1080 ADD R2,R2,#size% AND &FF
 1090 .reloclp
 1100 LDMIA R1!,{R3-R10}        ; Load da
ta
 1110 STMIA R0!,{R3-R10}        ; Store d
ata
 1120 CMP R1,R2
 1130 BLT reloclp               ; Until h
ad
 1140 MOV PC,R11                ; Call co
de
 1150 ]
 1160 ENDIF
 1170 ELSE
 1180 [OPT pass%
 1190 MOV R3,R0                 ; Remembe
r comm. tail addr.
 1200 MOV R0,#138
 1210 MOV R1,#0                 ; Set up
OS_Byte
 1220 .wrtpars
 1230 LDRB R2,[R3],#1           ; Load co
mm. tail byte
 1240 CMP R2,#13                ; If not
<RET>
 1250 SWINE "OS_Byte"           ; *FX 138
,0,<byte>
 1260 BNE wrtpars               ; And con
tinue
 1270 MOV R2,#6                 ; Else wr
ite VDU 6
 1280 SWI "OS_Byte"
 1290 MOV R2,#13                ; And <RE
T> code
 1300 SWI "OS_Byte"
 1310 SWI 256+21                ; Screen
output off.
 1320 ]
 1330 ENDIF
 1340 ENDIF
 1350 IF bas% THEN
 1360 [OPT pass%
 1370 ADR R0,module             ; Start a
ddr.
 1380 ADR R1,addcom             ; Buffer
addr.
 1390 MOV R2,#9                 ; Buffer
size
 1400 SWI "OS_ConvertHex8"      ; Start a
ddr. placed
 1410 MOV R0,#ASC","            ; Add com
ma
 1420 STRB R0,[R1],#1
 1430 ADR R0,module             ; Start a
ddr.
 1440 ADD R0,R0,#size% AND &FF0000
 1450 ADD R0,R0,#size% AND &FF00
 1460 ADD R0,R0,#size% AND &FF ; + size
= end addr.
 1470 MOV R2,#9                 ; Buffer
size
 1480 SWI "OS_ConvertHex8"      ; End add
r. placed
 1490 ADR R0,callbas
 1500 SWI "OS_CLI"              ; Call pr
ogram
 1510 MOV PC,R14
 1520 .callbas
 1530 ="*Basic -chain a"
 1540 .addcom
 1550 EQUD 0:EQUD 0:EQUD 0:EQUD 0:EQUW 0
 1560 ALIGN
 1570 ]
 1580 ENDIF
 1590 =""
 1600 :
 1610 DEFFNhelp
 1620 h$=LEFT$(name$,15)+STRING$(1+ABS(L
ENname$<10),CHR$9)+version$+" ("+MID$(TI
ME$,5,11)+")"+CHR$0
 1630 =h$
 1640 :
 1650 DEFFNapp
 1660 IF bas%:=0
 1670 =mods
```

```
  10 =    0 0    180 =  4C5 D    350 =   4CD C    520 = 24FA 9    690 = 4C5F 0    860 = 2086 3   1030 = 23C5 D   1200 = F9C4 C   1370 = A416 9   1540 = 211B 1
  20 =    0 0    190 = 9E5B F    360 =   8E1 A    530 = 9719 2    700 = DEB0 F    870 = FD2E 8   1040 = A1A5 2   1210 = BC3E B   1380 = D44D 7   1550 = E5F7 9
  30 =    0 0    200 = BEDF B    370 = 9719 F    540 = 5B46 3    710 =  AFE D    880 = 9719 F   1050 =  F42 F   1220 = ECE1 6   1390 = 9E91 0   1560 = 24FA 3
  40 = 9719 9    210 = 83E4 0    380 = 7993 0    550 = 5EF7 B    720 = 24FA 3    890 =  DC8 A   1060 = BE9B E   1230 = 24E6 7   1400 = DE77 7   1570 = 8B58 4
  50 = 6075 7    220 = 4408 B    390 = ED95 0    560 = 24FA 3    730 = 9719 5    900 = 7F8F 2   1070 = EA9F C   1240 = 1F31 9   1410 = 1076 3   1580 =  8E1 E
  60 = 262D 9    230 = 1A37 1    400 = AAAE 2    570 = 9719 C    740 = 3134 B    910 = 6825 0   1080 = BE0E 4   1250 = D8F8 4   1420 = B0EC B   1590 = E350 7
  70 = 9ED0 C    240 = 4ABB 2    410 = 95CD 2    580 = C8D7 4    750 = DE0B C    920 = 95CD 5   1090 = F0C2 9   1260 = CF15 C   1430 = A416 B   1600 = 9719 C
  80 = 97B1 F    250 = E7F9 F    420 = 9676 4    590 = 449B A    760 = 56DE 1    930 = 1560 9   1100 = 712A C   1270 = E2EE E   1440 = F567 F   1610 = D5CF 7
  90 = 9719 3    260 = 652D 6    430 = 52F4 1    600 = 24FA 3    770 = DA42 3    940 = 7E75 2   1110 = CB2D 9   1280 = BF50 3   1450 =  6E9 1   1620 = 3639 3
 100 = 413B F    270 = A974 7    440 =  E2A 3    610 = 1B5F F    780 = 9719 A    950 = BE10 7   1120 = 8B31 2   1290 = F307 1   1460 = C831 5   1630 = 6191 4
 110 = 6C6B B    280 = 1C7C 6    450 = 91FD A    620 = 3727 4    790 = 37A6 1    960 = 3B13 6   1130 = ABFF F   1300 = BF50 0   1470 = 9E91 B   1640 = 9719 1
 120 = 2C4D 6    290 = 7F8F 6    460 = D1FA 7    630 =  DFF 5    800 = 6009 1    970 = 9908 3   1140 = 3DC1 2   1310 = BB49 0   1480 = 4034 1   1650 = EC8A B
 130 = 2075 2    300 = ED6B C    470 = BC5D 3    640 =   4C 1    810 = E9B2 5    980 = 8B58 1   1150 = 8B58 4   1320 = 8B58 6   1490 = 992B E   1660 = 7BB4 E
 140 = 2154 0    310 = 5A06 C    480 = 356C E    650 = 9719 E    820 = 5130 5    990 = 4EDE 1   1160 =  8E1 2   1330 =  8E1 0   1500 = A643 8   1670 = 7380 C
 150 = B0F6 A    320 =  8E1 0    490 = 9719 B    660 = 3287 6    830 = 884C 4   1000 = 95CD 5   1170 = 18C0 7   1340 =  8E1 8   1510 = 9F7A C
 160 = 6E26 5    330 = 6825 B    500 = 3914 7    670 = 9719 8    840 = 825E 6   1010 = 8C4D F   1180 = 95CD B   1350 = 5C7F A   1520 = 93AA 5
 170 = 5348 9    340 = DF8F 2    510 = 2372 F    680 = B006 C    850 =  DB7 4   1020 = E99A 1   1190 = C462 1   1360 = 95CD F   1530 = BFE5 A
```

View through the arched window

Product: Archway II
Price:£99.95
Supplier: Simtron, 4 Clarence Drive, East Grinstead, West Sussex RH19 4RZ
Tel: 0342 328188

Terry Blunt discovers an easier way to create professional Wimp applications

THE Wimp system on the Archimedes provided by Risc OS, while being a delight for users, is a particularly difficult beast for the programmer to get to grips with. It's very flexibility dictates that there will be an enormous number of variables and flags to handle. This can be such a daunting prospect for inexperienced programmers that many give up altogether.

Simtron identified the need for a utility to ease this problem even before the introduction of Risc OS and produced Archway. Now, with Archway II, there is a fully fledged, multi-tasking suite of applications designed to enable you to produce professional Wimp programs that load to, and run correctly from, the icon bar. Simtron call such programs Archware.

The complete Archway system consists of a four disc set and a 300 page clip file manual. The manual is well written with a detailed explanation of what Archway is all about. Nearly half of the manual is dedicated to instructional programming sessions. Due to the complexity of Archway these are very necessary.

The discs are colour coded to help identification, and there are instructions for hard disc installation. The red and yellow ones contain all the tools necessary to build up your applications. The green one has some example applications and an extensive technical reference section in the form of directories of text files.

I would advise users to browse through these files, particularly if they get stuck. The black disc contains more examples, plus the run-time code.

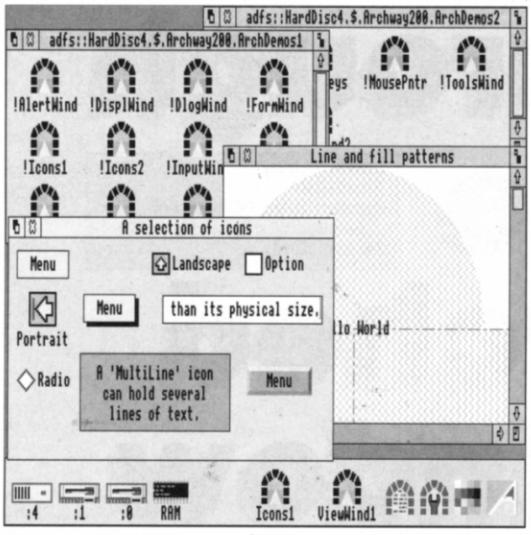
To start up !ArchTools is loaded on to the icon bar, from which most of the other parts of the system are accessed. The various editors will drop on to the icon bar as they are called for.

I'm not sure I'm entirely happy with this, as the icon bar can fill up pretty quickly and it's easy to forget which of the editors you are using. This is important, as you can only use one at a time. To create a new application click on Menu and then choose Create AppIn. You then select one of the Application shells provided by !ArchTools. It important that the right shell for the application you are creating is selected, although it is possible to make changes later. The options include a simple shell, a graphics orientated one, editor types, datapad and even a custom shell. All are described in some detail in the manual.

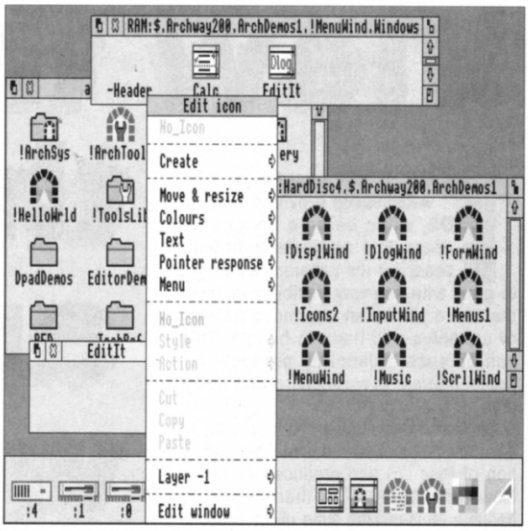
The new application shell will have the Simtron logo as its icon at first and has just enough code in !RunImage to be fully working, although it won't do a great deal.

The manual explains how to change the icon sprite to one of your choice, and very detailed instructions show how to use the editors to build up the window and menu definitions, as well as the !RunImage file itself.

All the editors with the exception of ➤



The icon bar fills up quickly



The window editor is extensive

➤

!BasicEdit are multi-tasking applications. Nevertheless, Simtron have made editing !RunImage very easy as their front end will allow you to drag the entire application under development on to its icon. It will then find the !RunImage file and load it into BasicEdit.

The environment Simtron provides is not just the Wimp management itself, but a large number of functions and procedures that handle all the commonest requirements within a Wimp environment.

When familiar with the system you will find that you can produce remarkably complex programs that seem to be populated with only function and procedure calls. Indeed, so much support code is provided that it can be a little disconcerting.

Much of your programming will consist of filling in empty function calls and responding to Archway's functions. It is essential to plan your window and menu structures on paper first, otherwise you'll get hopelessly lost when tacking extra bits on.

As with any system that aims to be user-friendly, there are constraints and limitations. Many of the resident integer variables are reserved, and you are advised to suffix all your variable names with the underline character to avoid possible clashes. Windows are classed by type rather than by the details of whether they are scrollable, movable and so on.

Archway insists on having a ram disc for much of its work and you will have to enable this using the task manager. Alternatively you can change the configuration to start up with a ram disc.

As the program size is only 64k I was surprised it was necessary but it seems that Simtron are trying to manage a balancing act between speed of execution and recoverability in the event of mistakes. This is really aimed at the professional user, where stopping to save work to disc becomes tedious, while on the other hand loss of data held in memory happens all to easily.

Archway can provide the necessary message passing to enable your application to load and save files, or pass them to, say, the printer driver.

To ensure that here are no clashes with commercial software, all filetypes are in the user range, that is from &000 to &7FF. Simtron suggest that you contact Acorn for filetype allocations if you want to distribute your final applications commercially.

Simtron have their own template system for windows which is partially compatible with !FormEd. Although it can read window templates produced by !FormEd it doesn't provide a conversion in the other direction, which is a pity.

Simtron also use a template system for menus, which as they point out, is faster than the more normal method of defining menus when they are called up. It is also relatively easy to use.

When you've created an application and want to make preliminary tests, the info window comes as a bit of a shock. Instead of the familiar grey box with white panels, Simtron use a rather garish blue background with what I think is supposed to represent a spiral binding on both edges, the program information is then centred inside it. While I can appreciate Simtron wanting to advertise their product, I think a more traditional layout would have been better.

Archway uses quite a sophisticated run-time library held in an application !ArchSys. Where you have a number of Archway programs working together from the same disc, which can represent a considerable improvement in efficiency due to the overall lower disc space requirement.

This is particularly relevant on a hard disc where you could have quite a large number of Archware applications.

However, I would have liked more information about the use of this library and instructions on how to make a completely stand-alone application including just the parts of the run-time library that your application needs.

This can be done by setting the ArchSys$Path variable in the !Run file of your application to the application's directory then copying in the kernel directory from !ArchSys and any other directories and modules that are required.

Archway's code is chiefly written in Basic 5, which means it is easy to incorporate your own code. There are provisions for sections of ARM code to be integrated where execution speed is important and you can add sections of compiled Basic if you are sufficiently experienced. As Archway uses Basic overlays you can't compile the whole of !RunImage for extra speed and security but a password system is available to make unauthorised modification of the code more difficult.

Clearly a great deal of effort has been put into Archway. The package runs very smoothly, although the editors can be a little confusing and slow in places. Most of the routines that you need are catered for. Simtron are happy to discuss problems that may occur in specialist situations, and are keen to see commercial Archware programs on the market.

Summing up

Archway is not easy to use for a novice, although far easier than managing the Wimp system directly. A middle-of-the-road programmer wanting to produce Wimp applications will find it very useful and at £99.95 reasonably priced. Really experienced programmers may want the greater flexibility and extra edge of speed from managing the Wimp themselves.

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By Jim Marchington Education Correspondent

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Simplicity can be so complicated...

Peter Dagg explains how psychology gives programming a new slant

WRITING programs that will allow your software to be fully expoited by non-micro users is no trivial task. In fact big companies employ psychologists, along with the usual computer experts, to help find the best way to present information.

We don't have those resources, so let's see what lies behind this work and how we can use it.

At heart the psychologist's approach is simply to give the program user's needs priority over all hardware and software considerations. While users may know nothing about micros they do know their jobs, and it's up to you to get to understand them too in order to write suitable software.

With this in mind your first task must be to get a clear grasp of exactly what your software has to do. This process is called task analysis.

Let's take an actual example: Suppose your milkman asks you to write a program to help him keep tabs on his customers and make up bills and records.

Initially neither of you will know what exactly is needed: He doesn't know what a BBC Micro can do and you don't know what his requirements are.

Your task analysis will involve finding out how he keeps his records now and how he uses them, and getting an idea of how better to do the job yourself.

What aspects of record-keeping does he take a long time over? Is there any way of using the micro to make it easier? What additional – useful – jobs could a micro perform which he wouldn't normally think about? How can the data be input easily and most clearly displayed? Is your final product going to be used or is the hassle of using it going to outweigh the help?

Let's say that you decide jointly that your program should allow the upkeep of records of each customer's consumption, draw up bills and produce a daily note for the round with reminders of cancellations and extras. This could be achieved simply by feeding in a record of deliveries each day after finishing the round.

Carrying out task analysis takes a lot of ➤

MICROMILK

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	8	1	0	1	0		
	4	1	1	1	1		
OAK CL.	1	0	1	0			
	7	C	1	1			
	8	2	2	2			
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	4	1	1	1			

Entering records on a 'logbook' screen display. By making computerised tasks seem familiar with a 'naive realism' users will be more confident and better able to exploit your software.

careful, thoughtful and self-critical work – never make assumptions, always check with the potential user. However, the time you take doing this will easily repay itself because what you finish up with is a set of ideas that will guide and instruct the stages of software development.

The next task, once you've decided what your program has to do, is to decide *how* your program will accomplish it using the information you've gathered and your knowledge of what the BBC Micro can achieve.

What you put together is a set of objects and processes with which the user can understand the workings of the program. Now, before you go to sleep, let's see what that sentence about objects and processes actually means.

In the DeskTop environment of the Archimedes you have icons – pictures which represent files – and a window which stands for the disc itself. These are objects. Now to copy from on disc to another you simply drag a file icon from one window to another. This is a process.

So an object is a way of representing information and a process is a way of representing what you can do with objects.

The value of a good user model can't be overstated. If all goes well your user will be

able to understand complex abstract ideas in simple physical terms he is familiar with. So he will be able to guess what he can do and use the program as he expects to – not as he is forced to by an uncooperative programmer.

What our computer-illiterate person wants is to be able to use the program easily and quickly, he doesn't want some so-called explanation which is just a rehash of jargon.

Creating a windows-style environment takes a lot of time and effort, and for the BBC Micro you could be out of memory before you'd even got to the main program.

However, you don't have to go to such lengths – it's up to you to assess the value of any enhancements by weighing your time, energy and commitment against the extra help they will provide.

For our milk round program we will be using a number of discs – most people have heard of disc drives and floppy discs nowadays, but there's no reason why they should have to learn anything about them in order to use this program. It's far better to present the input and display as some more solid and familiar form – perhaps as a log book-type display as shown on the previous page.

Another point concerns the terms used. If you have menu options try to keep to common English words like Write and Change, instead of Input and Edit.

Turn off the flashing cursor and try to create a turning page effect rather than just flashing up a new screen. In short, remove anything that is alien to your user model and do all you can to create a realistic artificial environment. Perhaps the file search facilities become a sort of hyper-secretary.

It can take a lot of imagination to find the right user model for a given task so be prepared to stretch yourself for functions which don't have a simple representation in your set-up. For example, the milkman may never have tried to analyse consumption over a long period because it would take too much work. But a micro makes the job easy – but how do you explain it?

Proper program development completely alters the emphasis from *How clever the programmer is* to *How easy the program is to use.* The user interface becomes the starting point, not the bit tacked on at the end.

● *Next month we'll take a look at developing the user model into an actual program with points to aim for and pitfalls to avoid.*

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PROBLEM Solved

Your technical questions answered by MIKE COOK

Topics on the agenda...

- Making a micro talk
- Interfering computers
- Changing tape speeds
- Typing disability
- Loading Electron roms
- Master incompatible?

Chatty micros

AT a recent show I managed to acquire some speech chips for my Model B but the only information on how to use them was that I should use SOUND -1 and the User Guide for the BBC Micro says that it's easy to use.

Can you advise me on exactly what commands I need to use or how to get further information on the use of these roms? **– F. J. Anderton, Chilwell, Notts.**

● *The speech system is very simple to operate, the command you want is:*

```
SOUND -1,X,0,0
```

where X is the word number stored in the phrase rom. These run from 32 to 291, with most numbers between 32 and 90 corresponding to their Ascii equivalents: &41 says "A".

In the April 1985 issue of ***The Micro User*** *there was a program called Chatterbox which used the speech system. It recited multiplication tables and played a Simon-type memory game. Among the various routines was a useful procedure to say any number passed to it, and here it is:*

```
DEF PROC_sayNumber(N%)
IF N%>99 OR N%<1 ENDPROC
IF N%=10 SOUND-1,264,0,0:ENDPROC
IF N%=11 SOUND-1,190,0,0:ENDPROC
IF N%=12 SOUND-1,273,0,0:ENDPROC
IF N%>19 SOUND-1,(N%DIV10)+32,0,0:S
OUND-1,137,0,0:N%=N%MOD10
IF N%>12 SOUND-1,(N%MOD10)+32,0,0:S
OUND-1,135,0,0:ENDPROC
IF N%<>0 SOUND-1,N%+48,0,0
ENDPROC
```

– David Mawdsley, Aylesbury, Bucks.

Radio interference

WHEN I am using my Model B and the radio is on as well I get a lot of interference on the sound. Especially if I am listening to an FM station. Is there any way I can stop it?

Also is there anyway of connecting my micro to a cassette recorder so that I can record the music it's playing? In particular I've been using the Jingles program from the December 1989 issue. Is there anyway of getting playback in stereo? – **David Mawdsley, Aylesbury, Bucks.**

● *Electronic devices like computers and TV sets radiate electromagnetic interference and, as you've discovered, this can be picked up by your radio. While it's possible to screen your machine by putting it in an earthed metal box it's not very convenient trying to type in one!*

The best bet is to separate the radio and micro as much as possible and try turning the radio to minimise the pickup. If you are using VHF try using an aerial mounted in the roof.

You can connect the sound output from your computer to most other devices. Just unplug the speaker and connect these wires up to your recorder. Make sure you use the Aux input and not the Mic one as you would swamp the input amplifier and get a distorted signal. To get stereo playback connect both inputs to the micro. You'll only get a mono effect although there are cross-over networks that can give a pseudo-stereo effect. See a book on hi-fi projects for that.

Got it taped?

I HAVE been trying to write a program to read in from tapes with different data formats and baud rates and I have some questions about the 6850 ACIA and its associated ULA.

I've got the interrupt handler working, dumping received 6850 data to the screen but I appear to have hit a snag when it comes to using baud rates other than 1200 and 300.

It appears that when bit six of the serial ULA register is clear – cassette selected – the baud rates set in the bottom six bits are ignored.

I have concluded that this is because as long as the 6850 control register is set to divide by 16 a standard BBC Micro 1200 tape can be read in perfectly regardless of

➤

Electron ram banks

I HAVE a Slogger-expanded Electron with a rombox plus a Pegasus 400 disc drive, I also have Starword and Starstore in a Pres cartridge. The expansion allows me to list the roms I have fitted as well as load and save rom images.

As Slogger are no longer trading I have assumed I'm not infringing copyright by copying the star roms and giving the cartridge to my daughter for her Electron.

The problem is that I can't load the roms that I've saved. Do I need 16k of ram? If so I do have sufficient slots available in my rombox, so can you tell me where I can get suitable ram chips? – D.G.W. Rance, Eltham, London.

● *Just because a company has ceased trading there is no reason to suppose you are not infringing copyright – which is in force until 50 years after the author's death.*

Any rom image must be loaded into sideways ram or blown into an eprom, and without knowing exactly what rombox you have it's impossible to say which chips would be usable, or indeed if it can be done at all.

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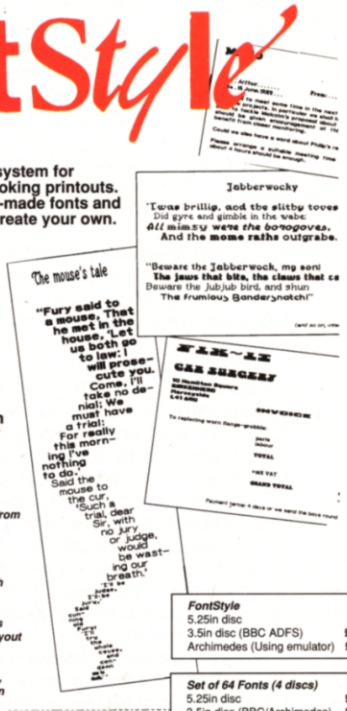

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Due to the complexity of the program the fill routines will not function correctly with the B+, Master or Compact – all other features are compatible

the Rx baud rate as set by FX7,x.

To read or write a 300 baud tape the divide ratio must be 64. Once again this is independent of the baud rate set. I can only assume that if the cassette system is selected the baud rate is hard selected too.

Could you tell me please if this would work out in terms of impedances and voltage levels? – Mike Wilson, Nottingham.

● *I can't really see why you want to read and write tapes at different speeds. The ones for the BBC Micro were very carefully selected to match up with the audio tones that are used.*

This standard was around long before the BBC Micro and is called the Kansas City standard after the place where a bunch of computer pioneers agreed to it. It has a sound technical basis because the tones it uses are 1200Hz and 2400Hz.

This means that at 1200 baud each bit sent consists of exactly one or two cycles of the audio tone. At 300 baud this expands to four and eight cycles. Therefore there is a direct connection between the audio tone received and the rate the data appears.

So what you do is use the audio tone to recover the clock frequency for the ACIA. In this way variations in tape speed, within certain limits, do not matter and the whole system is quite robust.

The difference between 1200 and 300 can be obtained by simply changing the ACIA. If you try to break this relationship between audio frequency and baud rate you run into all sorts of difficulties with harmonics, phase shifts and bandwidth.

Forgetting the boot

I UPGRADED my Model B to take discs by fitting the Acorn 1770 DFS and have found it to be much more efficient. Until recently it worked perfectly, but two months ago whenever I tried to load, save or do anything which involved discs and drive, the message *Disc fault 18 at 01/00* came up.

I took the computer to a repairer who said the drive head had been smashed and was unrepairable. So I bought a new disc drive from Watford Electronics thinking this would solve the problem, but after connecting it up I got exactly the same message.

I took the computer to a different repairer who after testing my discs and his discs – his loaded, mine didn't – told me that the broken head on the old drive had corrupted the boot sectors of my discs and that I might as well throw all my discs away as there would be no way to retrieve the data on them.

I can't believe this because a few days later my *Micro User* subscription disc arrived and refused to work even though it was clearly undamaged and hadn't been used on the old drive.

Surely if only the boot sectors of my discs are damaged the data on the discs would still be there? Is there any way of getting at it? – **Paul Cina, Glasgow.**

● *It seems that computer repairers are acquiring the same reputation as some car mechanics. The problem is that some simply don't understand computers and have graduated from repairing electrical equipment like TVs and radios.*

You seem to be hopping around from supplier and repairer. When your Watford drive failed to work you should have gone back to them to get it fixed, after all they sold it to you. A distance of 500 miles is irrelevant when you consider how much time and money you've wasted so far.

Neither of the repairers you spoke to knew what they were talking about. To begin with, a disc drive head can't be smashed by normal or abnormal operation, its not something they do spontaneously. Secondly, it's impossible for a broken head to corrupt your discs while at the same time reading them.

All that probably happened was that the drive head went out of alignment. This is caused by the track zero detection switch not being aligned properly, which means the tracks on your discs were recorded in a slightly different place to normal. It probably then went completely out of alignment, which was why it stopped reading even your own discs.

You then replaced the drive with one that had normal alignment so still couldn't read your own discs although the second repairer's ones were OK.

The subscription disc can be corrupted in the post, bent by the Post Office or it can be squeezed so that the doughnut inside won't go round – send it back to Database Direct for a replacement if this happens.

It should be possible to adjust the alignment of your current drive in order to read the discs. But if track zero is damaged it is still possible to recover the data, although it will take a while if you don't know where one file ends and another begins.

Grafpad on the Master

ABOUT three years ago I bought a Grafpad Art system from British Micro. It consisted of a touch pad and pen, a master disc and chip, the whole thing worked very well on my Model B.

However, when I subsequently changed to a BBC Master I found that it didn't work properly. Although I'm only guessing, I wonder whether the cause may be connected with either the chip or the User Port.

Unfortunately the suppliers are no longer at their original address of Penfold Works, Imperial Way, Watford and I cannot trace either them or Hegotron (micro computers) Ltd or Microdraw Ltd who, I believe, developed the Grafpad. The software itself was written by D. Beale in 1985.

I wonder if you can tell me what might be wrong or perhaps you have the current address of British Micro or Hegotron? – B. R. King, Newport, Essex.

● *There is certainly no hardware reason why Grafpad should be incompatible with the Master: Both User Ports are identical. However, are you sure the User Port on the Master is working?*

Does the Master have a Turbo co-processor fitted? If it does the rom might be trying to address the User Port directly, which won't work.

I did see British Micro at a computer show last year, but they seem to have moved completely into the PC market. We don't know their current location. Can any reader help?

Motor neurone dysfunction

AT my school there is a boy who was involved in a car accident and as a result he suffered severe motor neurone and brain damage. This has left him without full control of his bodily functions which presents a problem when he is trying to use a computer.

He has a twitch and this often causes him to press the wrong key. He then has to correct the mistake which is time consuming – and another mistake may take place.

In his eyes this is a failure and he gets upset. To try and help him he was introduces to 1st Word Plus which has the option to choose letters via a mouse.

Unfortunately this did not work out either as he could not keep the arrow on the correct letter because of his twitch.

I am trying to design and make something to help people with similar problems use a computer keyboard. I'd be very grateful for any information you can give me on this area. – Andy Davies, Eckington, Sheffield.

● I had a student with a very similar disability and I taught him programming on a mainframe computer and machine code on a micro board using a special keyboard screen that I got my technicians to make.

This is a very simple device which is basically a hard cover for the keyboard with a hole over each key. He could then drag his hands across the screen until he came to the key he wanted to press and then push his finger down the hole.

Although it did take time he did learn and ended up with a B.Sc. degree and the last time I heard he had a job designing computer fonts.

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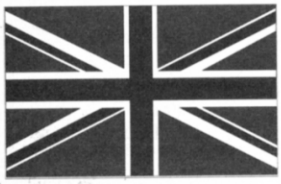

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Second generation

Marshall Anderson explores a new version of application design in Genesis II

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In the true spirit of an upgrade there is a conversion program that will allow your Genesis I applications to be used with the new package.

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Oak Solutions got over the memory problems that sampled sounds can create by playing them directly from the disc. This still doesn't reduce the amount of space they take up on a disc though.

The formatting and style of text on a frame has had a face lift, allowing multiple text styles – bold, italic and so on as well as colours. Also simple formatting lets you justify and centre text.

All of this is fine tuning, the real meat of this upgrade lies in the scripting language. Really only for boffins – or those with aspirations to boffinhood – it is extremely powerful. Via scripting you can create Risc OS applications without getting bogged down in the window manager. The language is fully programmable with variables, conditionals, looping, procedures and functions.

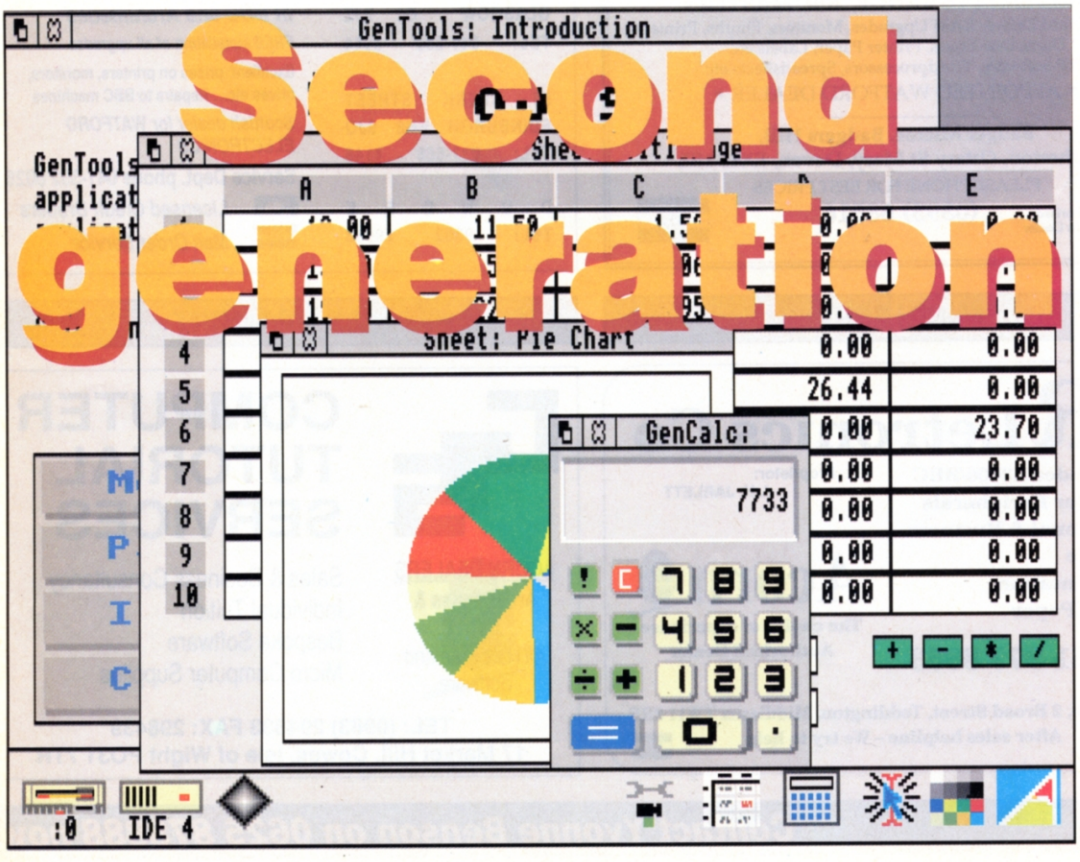
It uses event handlers to interact with the user, detecting mouse clicks on buttons, keyboard input, timer events, pages opening and closing and messages arriving from other applications. All these events can then trigger further scripts.

You can also define menus with submenus and Risc OS compliant dialogue and save boxes. File dragging can be detected and assessed with all the disc handling taken care of for you.

Another advantage of using these scripts is that you can access external devices like CD-Roms and interactive videos.

Summing up

To anyone familiar with the package this upgrade is simply a tidying up of loose ends. However, for those keen to explore the scripting language there is plenty of additional scope for creating really wonderful Genesis applications.



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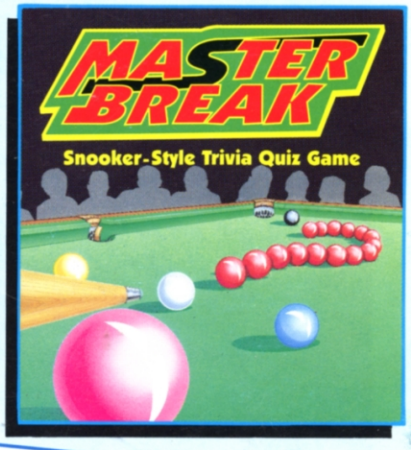

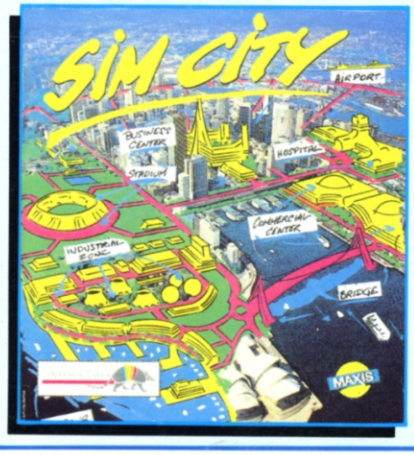

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